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A GENERAL VIEW OF THE NETHERLANDS

NUMBER I.

AGRICULTURE AND CATTLE BREEDING IN THE NETHERLANDS AND STATE MEASURES FURTHERING THESE BRANCHES OF ACTIVITY

THE SERIES OF PAMPHLETS GIVING TOGETHER A GENERAL VIEW OF THE NETHERLANDS HAS BEEN PUBLISHED FOR THE P. P. I. E. 1915 UNDER DIRECTION OF THE COMMERCIAL DEPARTMENT OF THE NETHERLANDS MINISTRY OF AGRICULTURE, INDUSTRY AND COMMERCE AT THE HAGUE

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AGRICULTURE AND CATTLE BREEDING IN THE NETHERLANDS AND STATE MEASURES FURTHERING THESE BRANCHES OF ACTIVITY.

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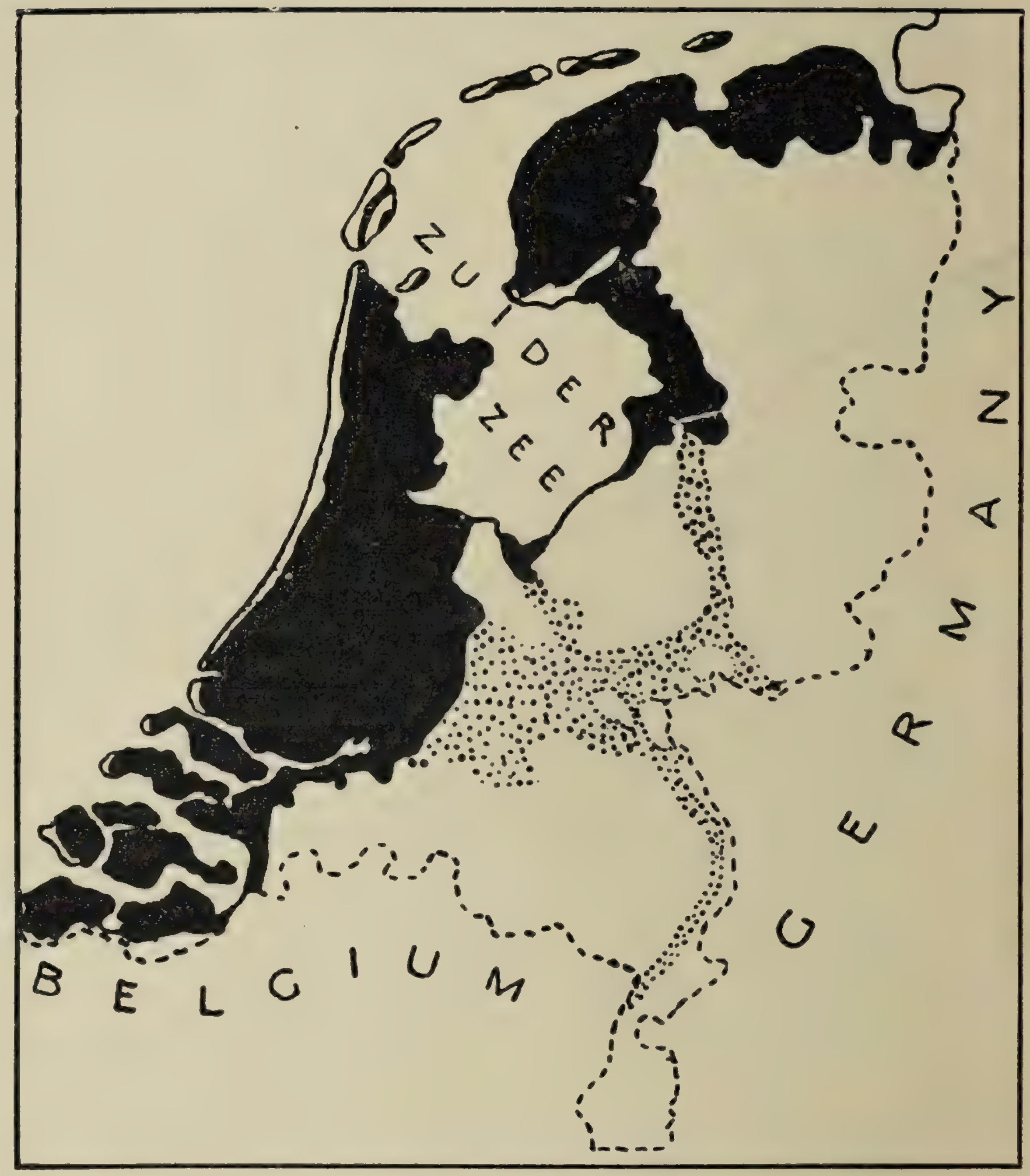
AGRICULTURE, THE CHIEF INDUSTRY OF THE NETHERLANDS.

AGRICULTURE is the greatest industry of The Netherlands. The total value of the yearly agricultural production is about 600 million guilders ($ 240,000,000).

By drawing a line from north-east to south-west the country can be divided into two parts. Beneath this line the soil is mostly gravel and sand, which have been brought there by the glaciers and their molten waters from Scandinavia and Mid-Europe. Here the soil is generally poor. It lies from 10—50 M. (1 M. = $3^1/_4$ feet) above the sea. The highest point of The Netherlands is about 240 M. above the sea. In these sandy districts an important part of the land is still uncultivated or is covered with wood. The cultivated land consists in arable land on the highest parts and grass on the lower parts, especially along the small rivers. Along the large rivers, which cross the sandy districts, the soil consists of clay (river clay) used for tillage as well as for grass. In the North and West the soil has been formed by an alluvial process, and consists partly of clay and loam, brought there by the sea and reclaimed (sea clay), partly of a kind of very low and wet peat soil. A large part of the West of the country lies below the level of the sea. All the rain falling upon it has, therefore, to be artificially pumped up. From olden times farmers have formed draining associations and large combinations of these. The lifting of the water used formerly to be done by windmills. Now they are more and more replaced by steam mills.



Map of the Netherlands showing approximately the area (in black) which would be inundated if the sea dikes broke, and the area (in dots) which would be covered by water if the river dikes gave way (After Blink).

In order to let the water run down from the land every field had to be surrounded by ditches. From these ditches the water is pumped into canals, whence it is again pumped into larger ones, and from these it runs into the river or the sea.

In olden times many large lakes were found all over the provinces of North and South Holland. Most of these lakes have been drained and are now cultivated. One of the most important works of this kind is the pumping out of the Haarlem lake (1848—1852) by which about 45,000 acres were obtained.

In the North-east of the country the reclaiming of peat bogs is carried out on a large scale. Formerly these bogs were almost absolutely waste land. During about three centuries past the peat has been cut and used for fuel, and the sand on which the peat lay is cultivated by mixing it with a thin layer of peat left on the bottom of the bog. These cultivated bogs ("veenkoloniën", as we call them) now form one of the most interesting agricultural districts, where especially potatoes are grown for potatoe flour factories.

On the light sandy soil in the East and South, where most of the holdings are small (between 15 and 30 acres), the chief produce of the arable land is rye. The rye is not sold but used to feet the pigs and, with grass and hay, the cows. The products which go to the market are pork and butter, the latter principally made in dairy factories.

Crops are grown, on the other hand, on the rich clay and loam soils in Groningen, Zeeland and also in some parts of Friesland, and North and South Holland: corn crops, sugar beets, potatoes, flax, caraway seed, harico beans, onions, etc. Here the farms are larger, between 100 and 200 acres.

The number of cattle kept on these farms varies greatly. In many cases farmers keep only a few head of cattle and sell the whole produce of the land on the market. The grass districts are very important. They are mostly found in the provinces of Friesland, North and South Holland and Utrecht. In these districts there is practically only one crop, viz., grass. Hundreds of square miles of green land, abso-

A farm on the island of Walcheren (Zeeland).

A country dwelling at Laren in "Het Gooi" (North Holland).

lutely flat, are only broken by the canals, the farmers' houses and a few villages, whilst the meadows are scattered all over with cows.

The first produce in these districts of course is milk. In Friesland most of the milk is used for butter-making and cheese-making. This is done in large dairies; most of them are carried on on a co-operative plan.

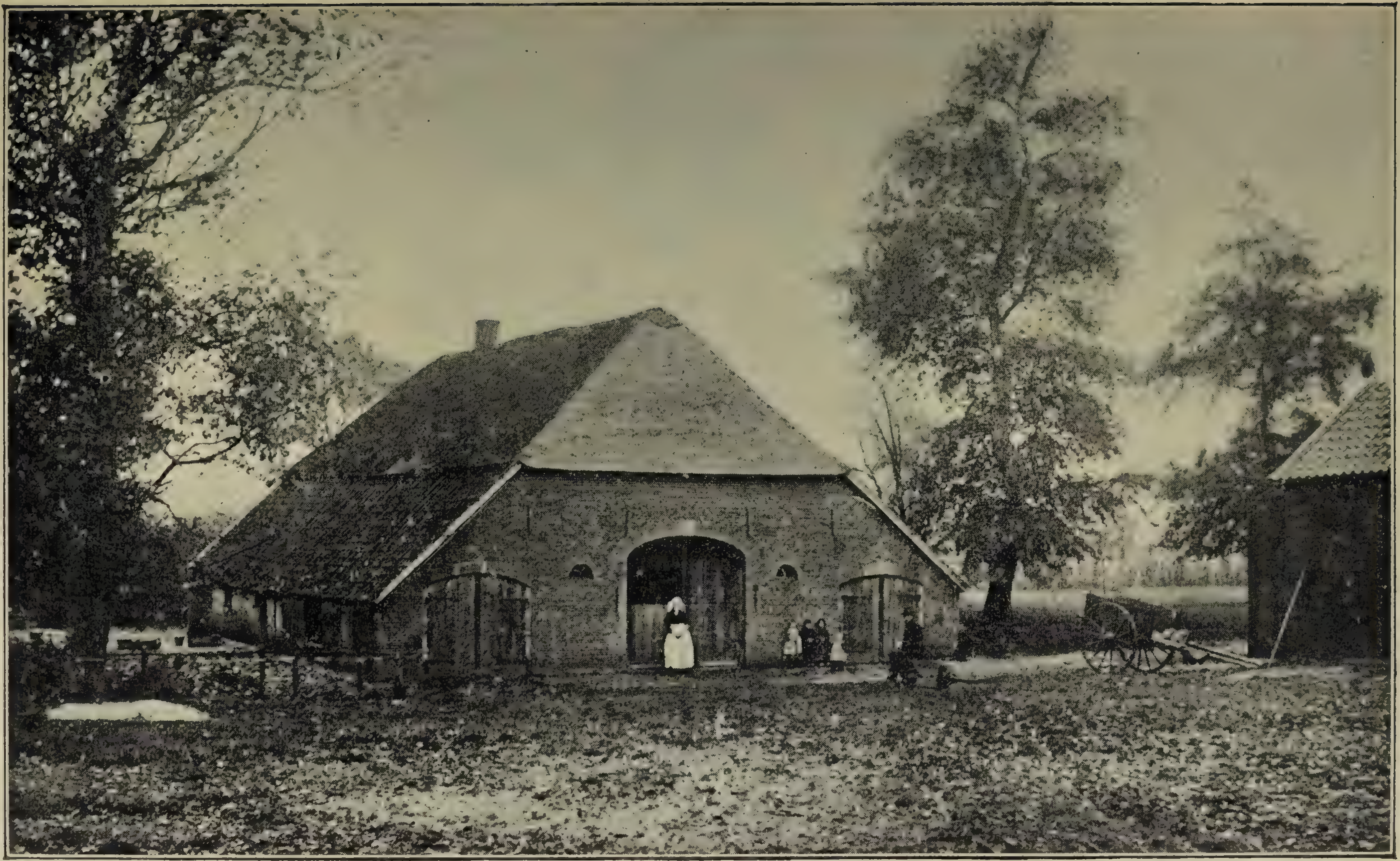
In North Holland the principal produce is Edam cheese, made partly on the farm and partly in factories.

A farm at Drongelen in North Brabant.

In South Holland the milk is used for Gouda cheese, made on the farm.

Farms of 50—75 acres are very common in the grass districts.

In the "Veenkoloniën" (fen colonies) the principal crops are potatoes, rye and oats. The stock of cattle is very small



A farm at Kootwyk (Gelderland).

here. The potatoe flour factories and strawboard factories are interesting; they are partly based on a co-operative system.

The conditions for growing different kinds of horticultural produce are very favorable in Holland. The climate is soft and mild and the soil is never too dry, because the water in the canals stands only a few feet under the surface of the garden and can be maintained on the same level in dry as well as in wet times. These canals are also useful to carry the produce to market and to get the manure to the garden.

A farm at Heerhugowaard in North Holland (Frisian type).

The most typical Netherlands horticultural produce is the bulbs. They are cultivated on the sandy soil behind the dunes. A centre of floriculture is Aalsmeer. Large nursery districts are found at Boskoop, Oudenbosch and Naarden.

The most interesting districts for vegetable-growing are the following: the Westland near The Hague, with its important vegetable-growing under glass; the Langendyk, a large cabbage and cauliflower district, near Alkmaar; and The Streek in North Holland, where early potatoes are largely grown.

Beverwyk is an important strawberry district.

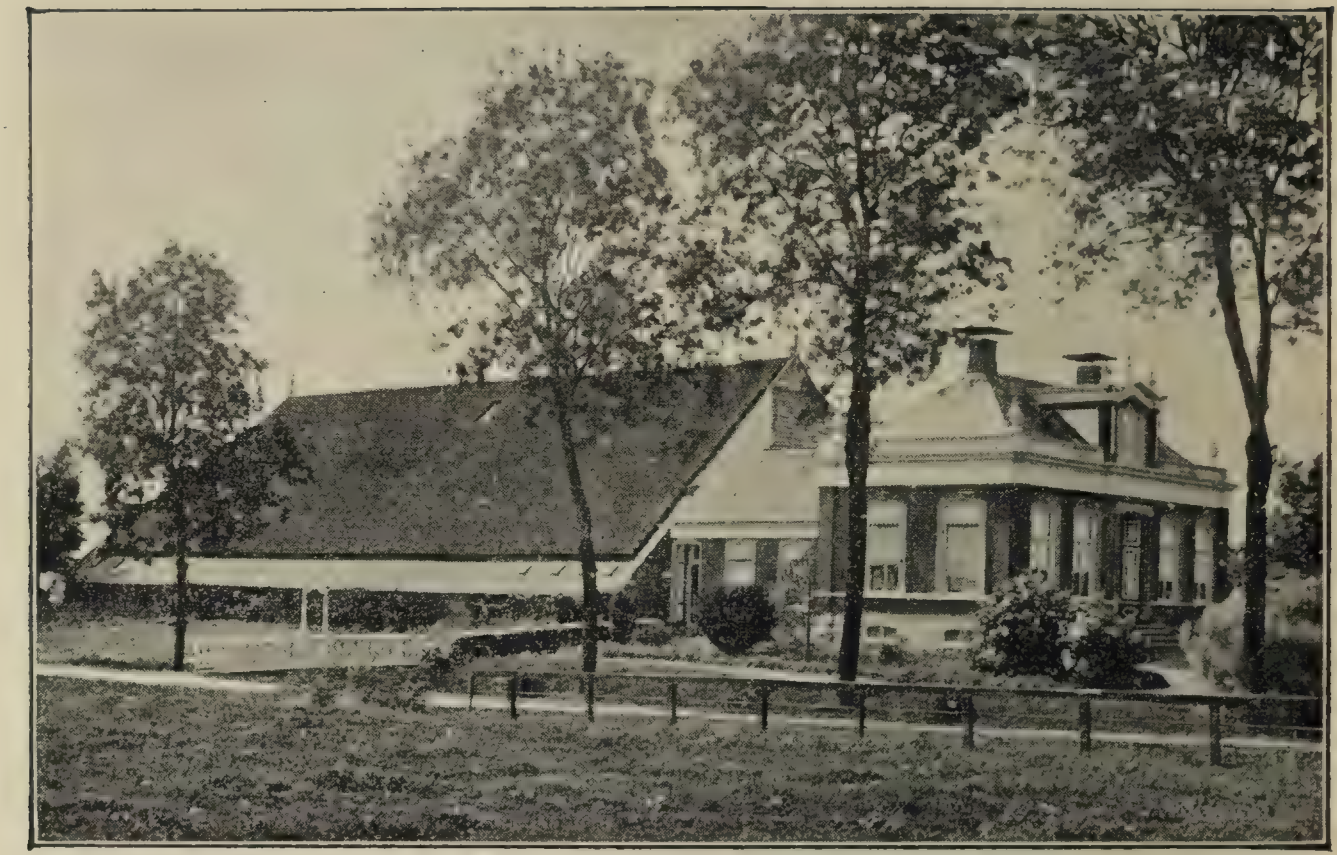
Near Rotterdam and Delft vegetable-growing is also a large industry.

The most important fruit-growing districts are the Betuwe, South Limburg and South Beveland. In the Westland much fruit like grapes and peaches is grown in hothouses.

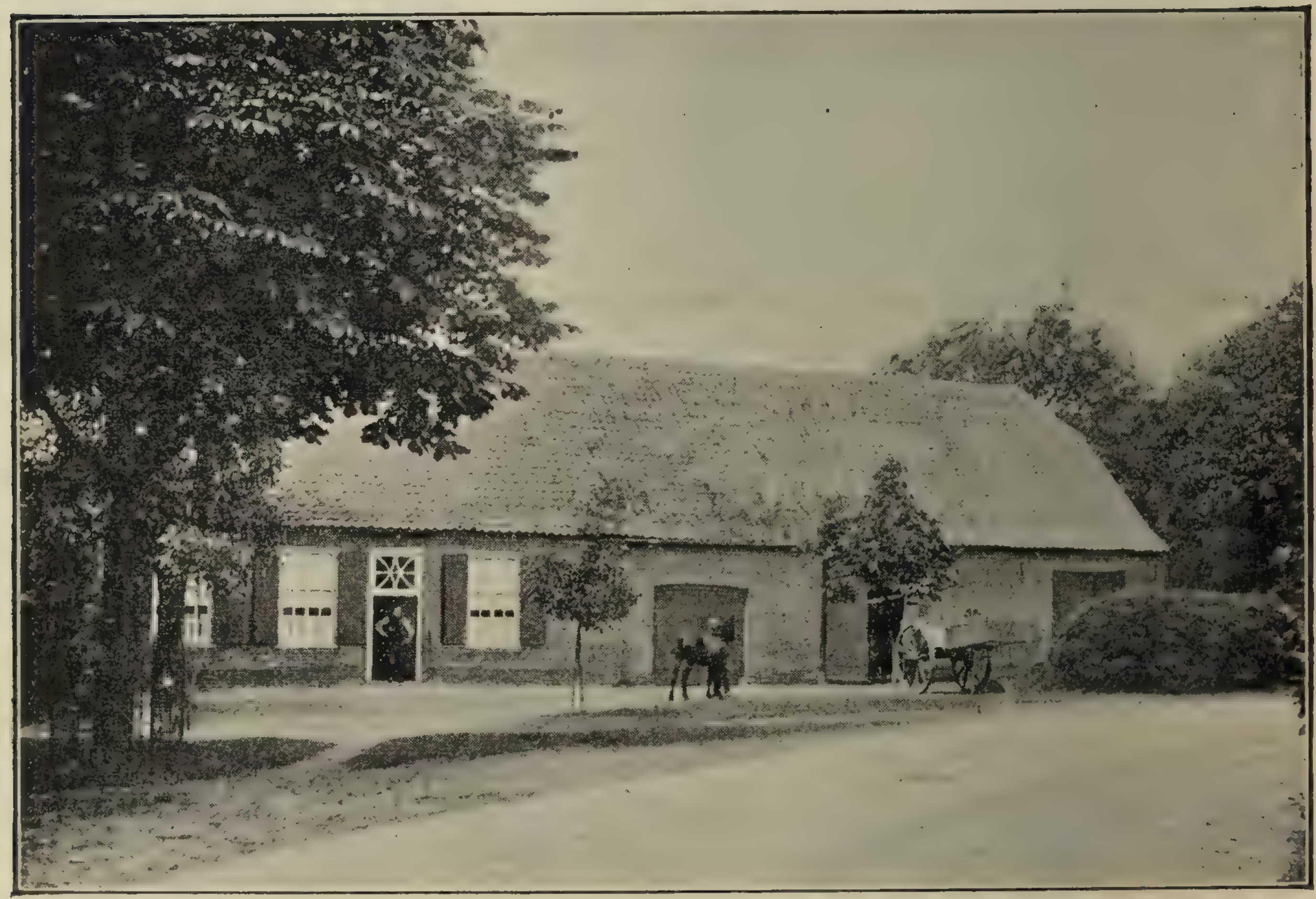
A Limburgian yoke drawing a harrow.

The country has a surface of 3,200,000 H.A. (1 H.A. is about $2^1/_2$ acres) of which 27 per cent is arable land, 37 per cent pasture, 2.50 per cent is used for horticulture, 8 per cent for forestry, 16.5 per cent is waste land, and 9 per cent is used for sundry purposes.

In 1910 the number of farms (agricultural and horticultural) with more than 1 H.A. land was 209,000. The Netherlands is a country of small farms.



A farm at Mensingaweer (Groningen).



A farm at Maarheeze (North Brabant).

A farm in North Holland.

An old country dwelling in Drenthe.

Seventy-two per cent of the holdings are from 1—10 H.A., 15 per cent from 10—20 H.A., 11 per cent from 20—50 H.A., and less than 2 per cent are above 50 H.A.

Some 46.49 per cent of the cultivated area is used by owners and 53.04 per cent by tenants. Tenancy is increasing. In the different parts of the country the situation is not the same. In Friesland only 27 per cent of the soil is cultivated by owners and in Groningen 68 per cent.

Fifty-one per cent of the 860,000 H.A. arable land is used for corn (rye, oats, barley, wheat), 18.7 per cent for potatoes, 6.47 per cent for sugar beet and the remaining part for a large number of other crops.

The following table gives the number of the different kinds of farm animals in 1910:

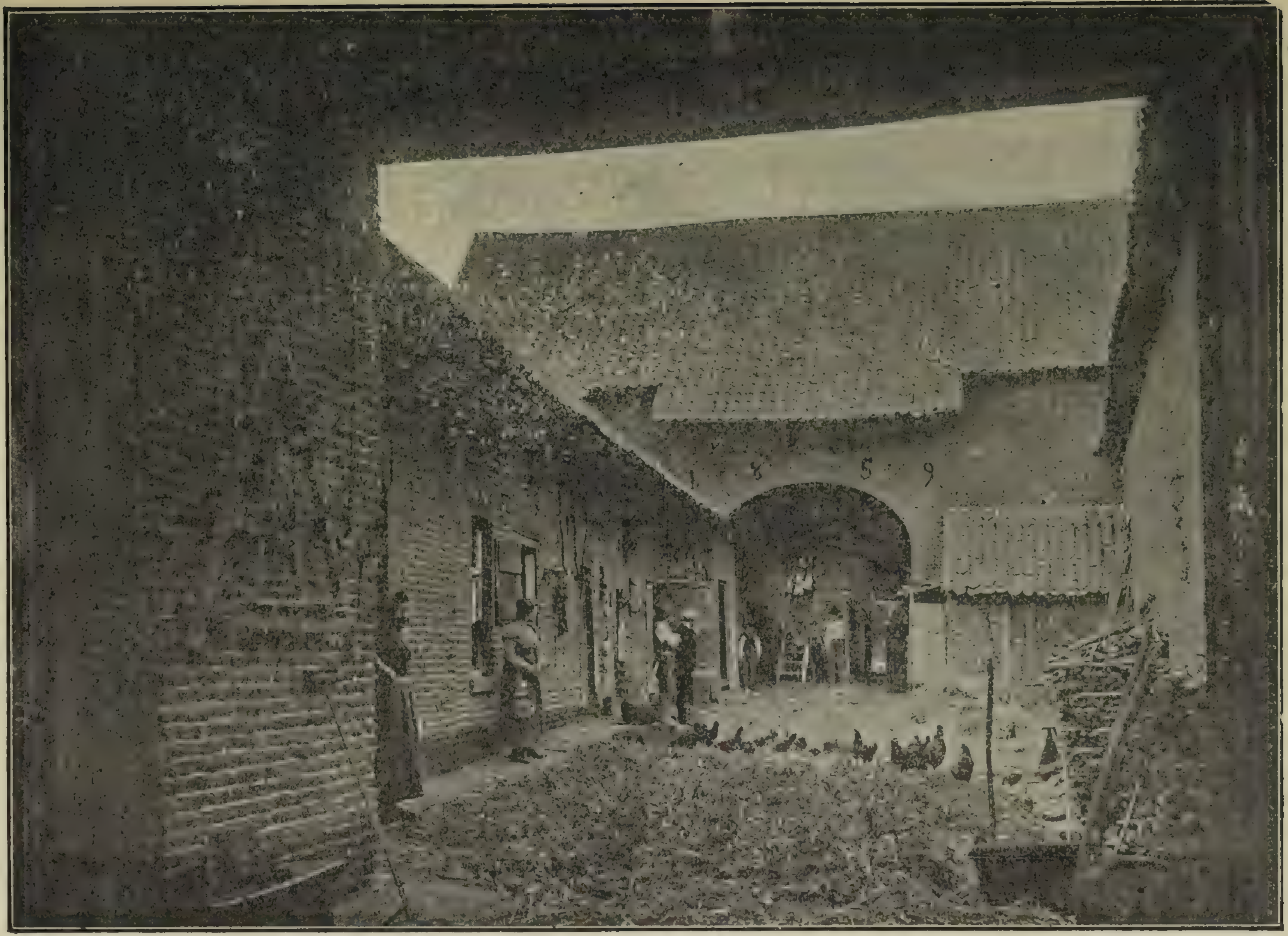
	Total number.	Number on 100 H A. cultivated land.	Number per 1,000 inhabitants.
Horses	327,000	15	56
Cattle	2,026,000	94	348
Pigs	1,260,000	59	216
Sheep	889,000	41	153
Goats	224,000	10	38

It is clear that the number of animals varies much for the different districts. In the fen colonies of Groningen the number of cattle is only 24 on 100 H.A. cultivated land, and in the grass districts of Holland it is about 200.

The quantity of butter produced yearly is about 154 million lbs. (119 million in factories and 35 million on the farm).

The cheese production is about 211 million lbs. (97 million in factories and 114 million on the farm).

The Netherlands only grow a part of the corn they use. A part of it has to be imported. Our imports of wheat and maize especially are considerable. On the other hand, the country has an important export of agricultural produce:



Inner court-yard of a farm in the south of Limburg.

butter, cheese, meat, cattle, bulbs, plants, vegetables, fruit, starch and strawboard.

The total value of this export is about 230 million guilders (£ 19,000,000). The value of the principal exported articles is as follows:

Butter.	50	million	guilders.
Cheese.	35	"	"
Cattle.	30	"	"
Meat	25	"	"
Horticultural produce	20	"	"
Starch.	9	"	"
Strawboard.	6	"	"

The increase in the export of agricultural produce in the last few years is due to different causes, viz.:

(1) Soil and climate make the country fit for cattle breeding and gardening;
(2) The vicinity of large consuming centres, London and the German mining and industrial districts;
(3) The fact that The Netherlands is a free trade country.

CATTLE BREEDING IN THE NETHERLANDS.

I. INTRODUCTION.

Cattle breeding may be considered as one of the most important branches of Netherlands production.

In the agricultural industry it holds by far the most prominent place, as is shown by the large area of grass land, viz: 1,221,876 Hectares, compared with 882,255 Hectares of arable land ¹).

Although a considerable quantity of corn is imported into The Netherlands, there is an extensive export of cattle and cattle products.

Next in importance to cattle-breeding comes, in the eastern provinces, pig-farming, whilst on better class lands and on the moors sheep-farming occupies an important

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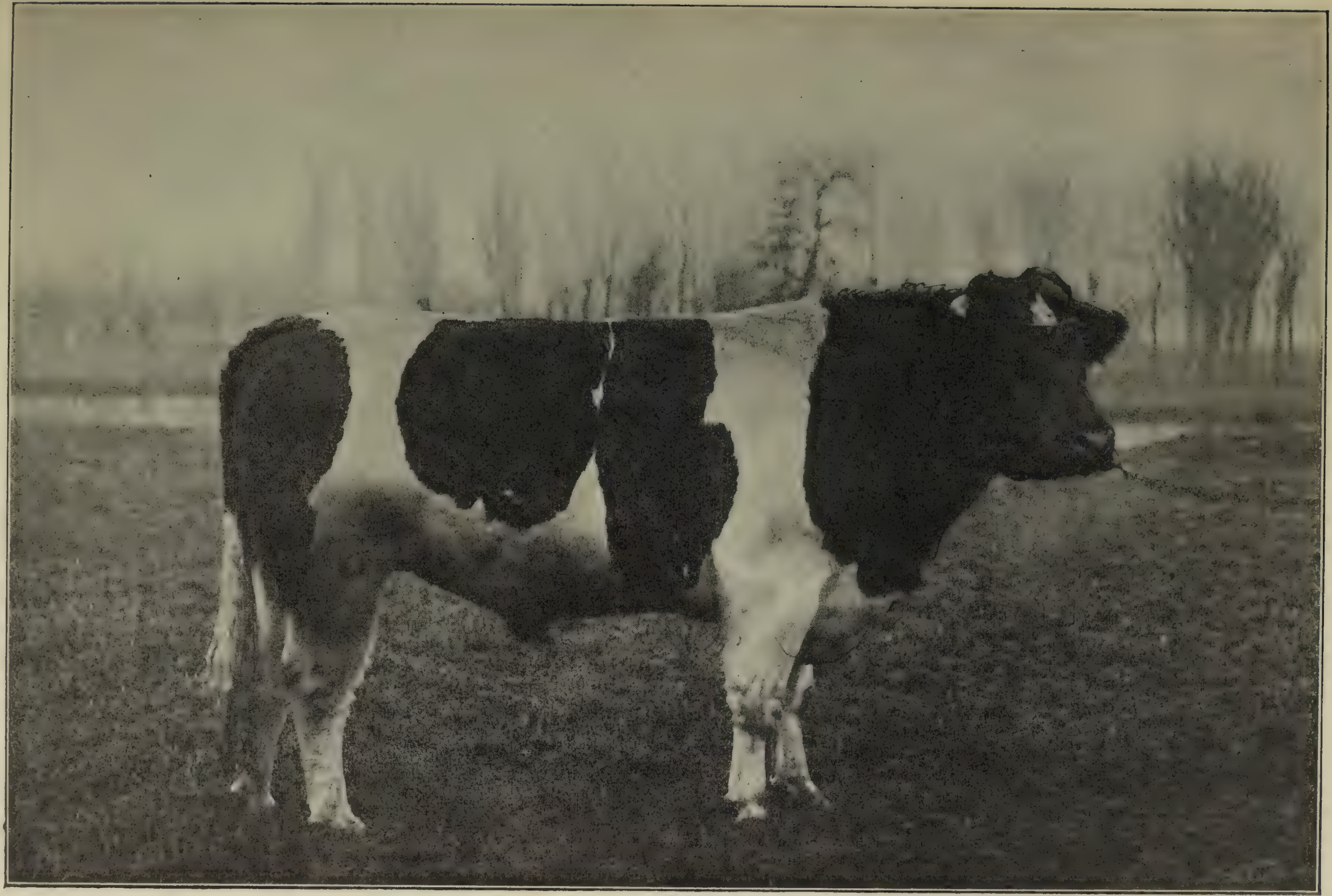
¹) A fairly complete survey of statistical information is to be found in the annual "Verslag van den Landbouw in Nederland" (Agricultural Report of The Netherlands).



The black and white Holland breed.

place, although this latter has dwindled more and more in comparison with the more profitable cattle-farming. Horse-breeding is only of importance in a few parts of the country.

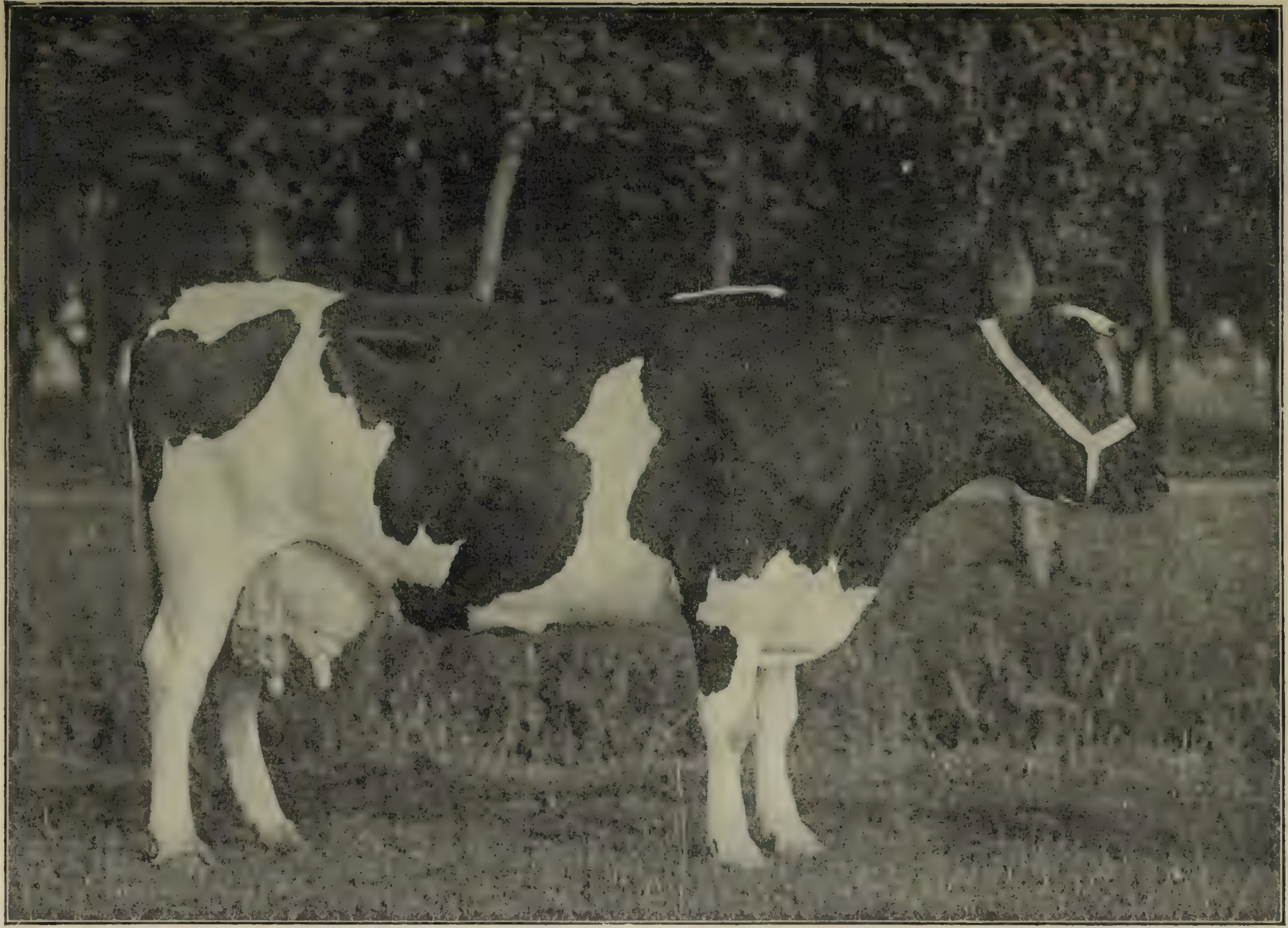
In June, 1910, there were 2,026,943 head of cattle in The Netherlands, viz: 23,309 bulls, 1,068,361 milking cows and cattle in calf, 47,068 fattening calves, 97,688 fattening cattle other than calves, 389,339 young cattle of more than 1 year old, and 401,160 of less than one year. This works out at 94 head on each 100 hectares of cultivated land, or 61 head on each 100 hectares of the total area.

The following comparison with other countries shows that nowhere else is such thickly stocked land known:

	Census Year.	Number of cattle per 100 hectares.	Number of cattle per 1,000 inhabitants.
The Netherlands	1910	612.9	347.9
Belgium	1895	482.4	221.6
Denmark	1903	472.3	730.6
Germany	1907	381.5	329.9
Great Britain & Ireland	1909	373.9	260.5
France	1908	265.4	362.8
Austria	1900	317.0	363.7
Italy	1908	216.1	182.7
U. S. A	1900	74.0	910.0
Argentina	1908	98.7	4,490.5
Australia	1908	13.7	2,513.1

The stock cattle is distributed unequally over the country. The impression left on the foreigner of the fertile Netherlands is sometimes exaggerated.

Exceptionally fertile land is met with along the coast, in the provinces of Zeeland, South and North Holland, Friesland and Groningen, partly also along the rivers; but the eastern part of the country, the area of which considerably exceeds that of the polders and river alluvions, consists for the greater part of sand which, on the whole, does not excel in fertility. Although, considering the circumstances, the stock of cattle in these parts may be regarded as large, it is not so large as that which is met with in the clayey and



The black and white Holland breed.

marshy districts. Moreover, in the clayey districts important differences are to be seen, depending upon whether the land is under cultivation or used for grazing purposes. In some of the clayey districts, such as Zeeland, the Holland polders, and the North of Groningen, cattle-farming is not very important. On the other hand, in Friesland, on the clay land and peat soil round the Zuyder Zee, in the greater part of the provinces of North and South Holland and in the western part of Utrecht cattle-breeding is the main point. As many cattle as the land will allow are kept there. The products of tillage are also, to a large extent, consumed by the cattle.

The maximum density of cattle is met with in those districts of The Netherlands where the by-products of the gin distilleries are used as fodder. A few figures [1]) will elucidate this, whilst moreover the reader is referred to the map.

	Cattle Per 100 hectares cultivated land.			Per 100 hectares cultivated land	
	In the whole province.	In the most thickly stocked district.	In the least stocked district.	Sheep	Pigs
Groningen	55	121	24	54	33
Friesland	114	148	95	62	37
Drenthe	80	117	50	58	78
Overyssel	92	105	89	14	66
Gelderland	97	108	82	20	91
Utrecht	138	180	71	28	89
N. Holland	103	148	72	134	31
S. Holland	127	206	60	37	78
Zeeland	57	80	50	21	30
N. Brabant	80	93	65	14	47
Limburg	81	93	70	14	78

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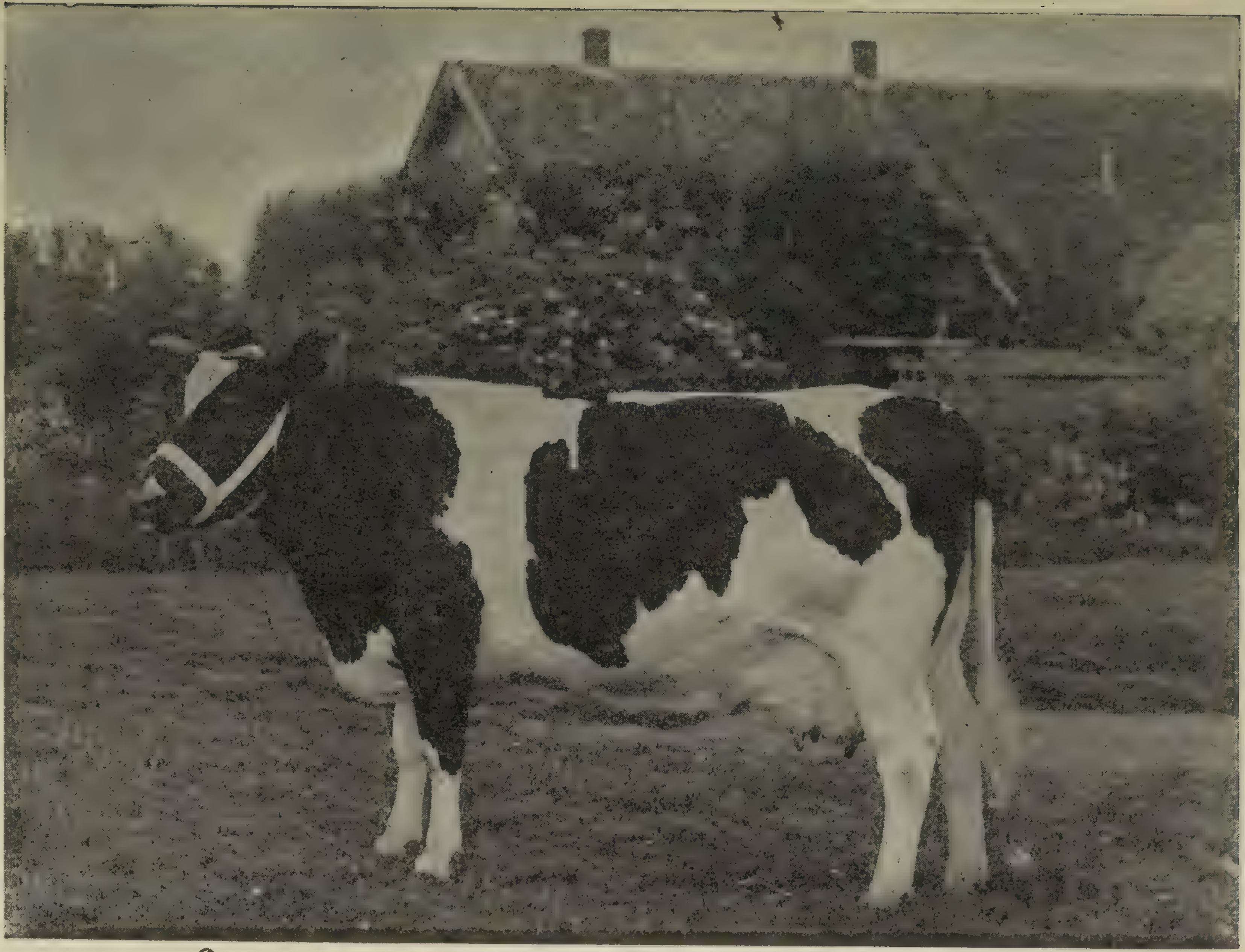
[1]) Taken from the report of the Direction or Board of Agriculture, 1912 No. 3. "Het grondgebruik in Nederland." (The Use of Land in The Netherlands).



The black and white Holland breed.

The exceptional extension of cattle-farming in The Netherlands must be attributed to various causes.

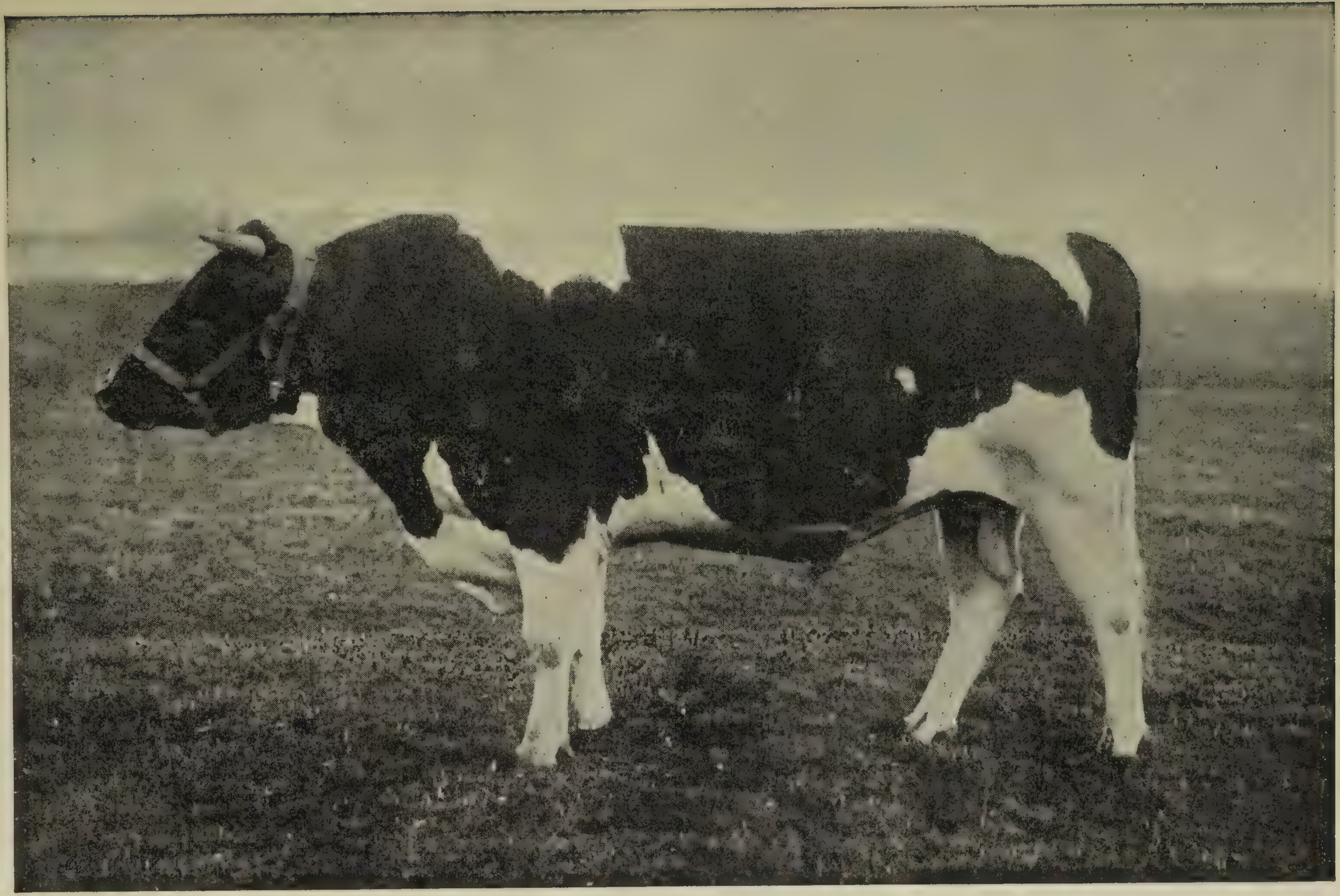
In the first place the damp sea climate must be taken into account, and the low-lying and fruitful soil of an important part of the country, which is so exceptionally favourable for the growth of grass that meadowland is generally the permanent form of exploitation. For cattle raising itself such a climate is at the same time very suitable, and the milch cows have no better conditions than the luxurious meadows and, in winter, the excellent hay. These circumstances have always been the same, and history teaches us that cattle-breeding in The Netherlands has always been one of the principal branches of agriculture. The extensive business activity in the western provinces was long ago the cause of a partial development of agriculture.

A second important factor is the presence of excellent breeding stock. For centuries Netherlands cattle has been celebrated for its excellence; it has been a matter of debate whether this excellence is derived from a special breed belonging to the olden times or whether it is due to the beneficial effect of soil and climate, or to the systematic choice of breeding stock. It is not certain what causes have brought the various breeds to their present high standard. The history of the descent of our cattle lies for the most part in obscurity, but it is probable that all three of the abovementioned factors have worked together.

In the last half century systematic breeding has played an important role, and great improvements have been made.

At the present time cattle-farming is still extending owing to various reasons.

This is due in the first place to what has been done in the Eastern and Southern provinces, where agriculture has undergone a veritable revolution both economically and technically. The soil in these parts is for the most part poor and sandy and was originally covered with woods and heather, and in those places which the Saxon and Frank settlers had partly brought into cultivation the scanty industry brought little to the markets and confined itself principally to the requirements of the household.



Black and white North Holland bull.

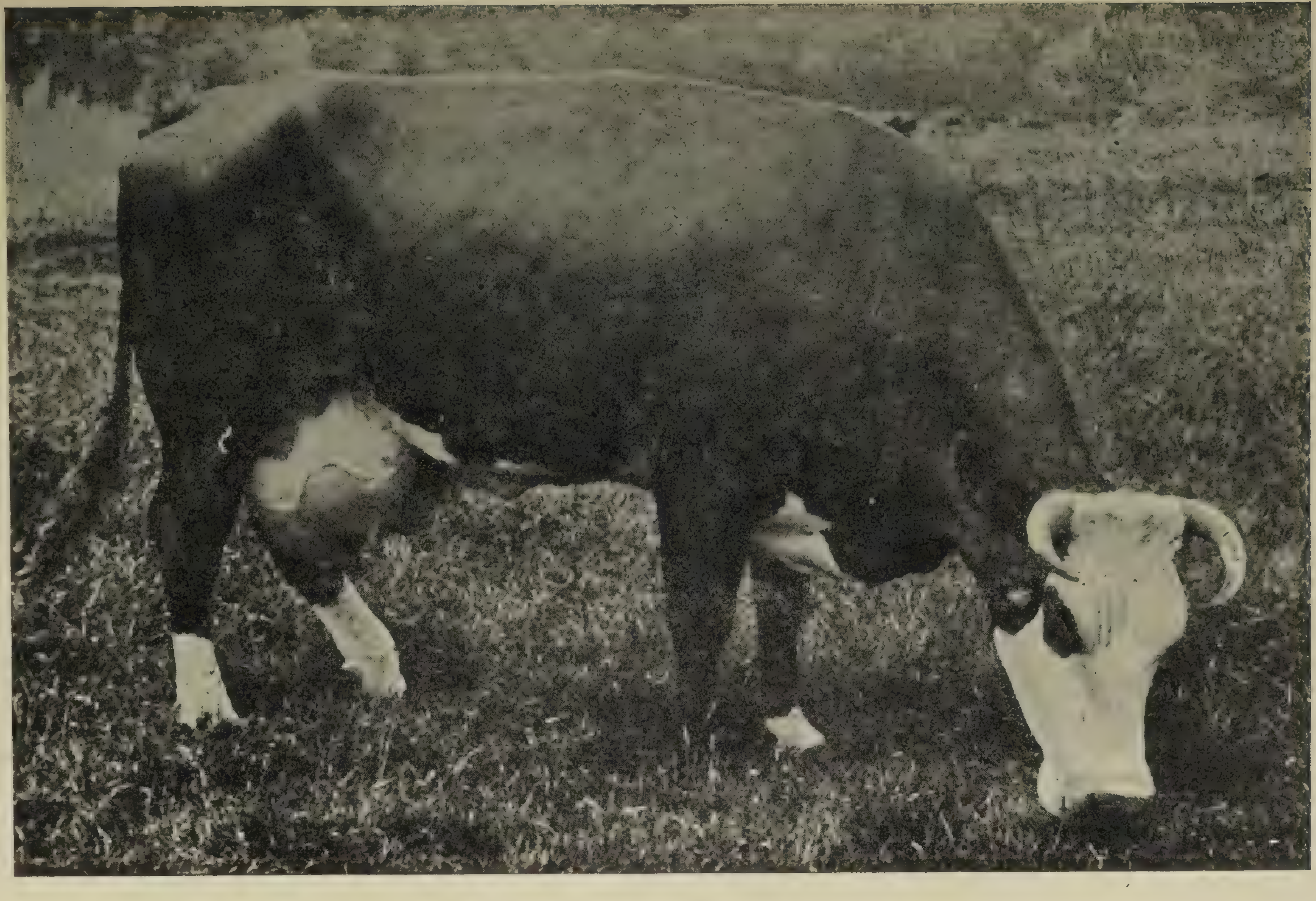
To manure the rye-fields large tracts of heath land were despoiled of turf and sheep were then grazed there. The cattle, kept in old-fashioned cow-houses, yielded a small amount of butter of an inferior quality which, together with a few pigs and potatoes, was sold in the towns (not infrequently exchanged for the necessary Colonial wares, clothes, etc.).

At the present time these districts present quite another aspect. The heath land is to a large extent developed by means of artificial manure; large quantities of concentrated food are used together with the products of the farm itself; butter dairies have arisen on all sides; the old-fashioned cow-houses have been replaced by cleanly and modern ones; everywhere improvements have been adopted.

When one considers that the export of butter increased from 50 million lbs. in 1902 to 83 millions lbs. in 1913 the reason must in the first place be ascribed to the revolutionary progress in the sandy districts. Of course agricultural science and skilled dairy labour have also done their part towards increasing the intensity and rentability of cattle-farming on the heavier lands. Another circumstance, which was also of great import, was that since the crisis of 1880—1895, caused by the sudden flooding of our market, which is unprotected by any tariff, with American products, the prices paid for cattle products have risen considerably more than those of corn.

Consequently corn growing is decreasing in The Netherlands and the growing of fodder is increasing, whilst in various parts permanent meadow land is taking the place of arable land. Tillage maintains its position more especially by the production of different commercial crops (potatoes, horticultural crops, etc.) and by the perfection of its technical execution (the islands of Zeeland and South Holland, the polders of North Holland and the tillage districts of Friesland and Groningen).

In view of the nature of the land and of the various breeds of cattle, the breeding of dairy cattle combined with the preparation of butter and cheese is the main point. The fattening of cattle, although naturally carried on to a



White head Groninger cow.

larger or smaller extent, is in general merely a secondary matter. Where we treat of the various branches in detail we will return to this point.

II. THE NETHERLANDS BREEDS OF CATTLE.

At the present time three breeds are to be distinguished:

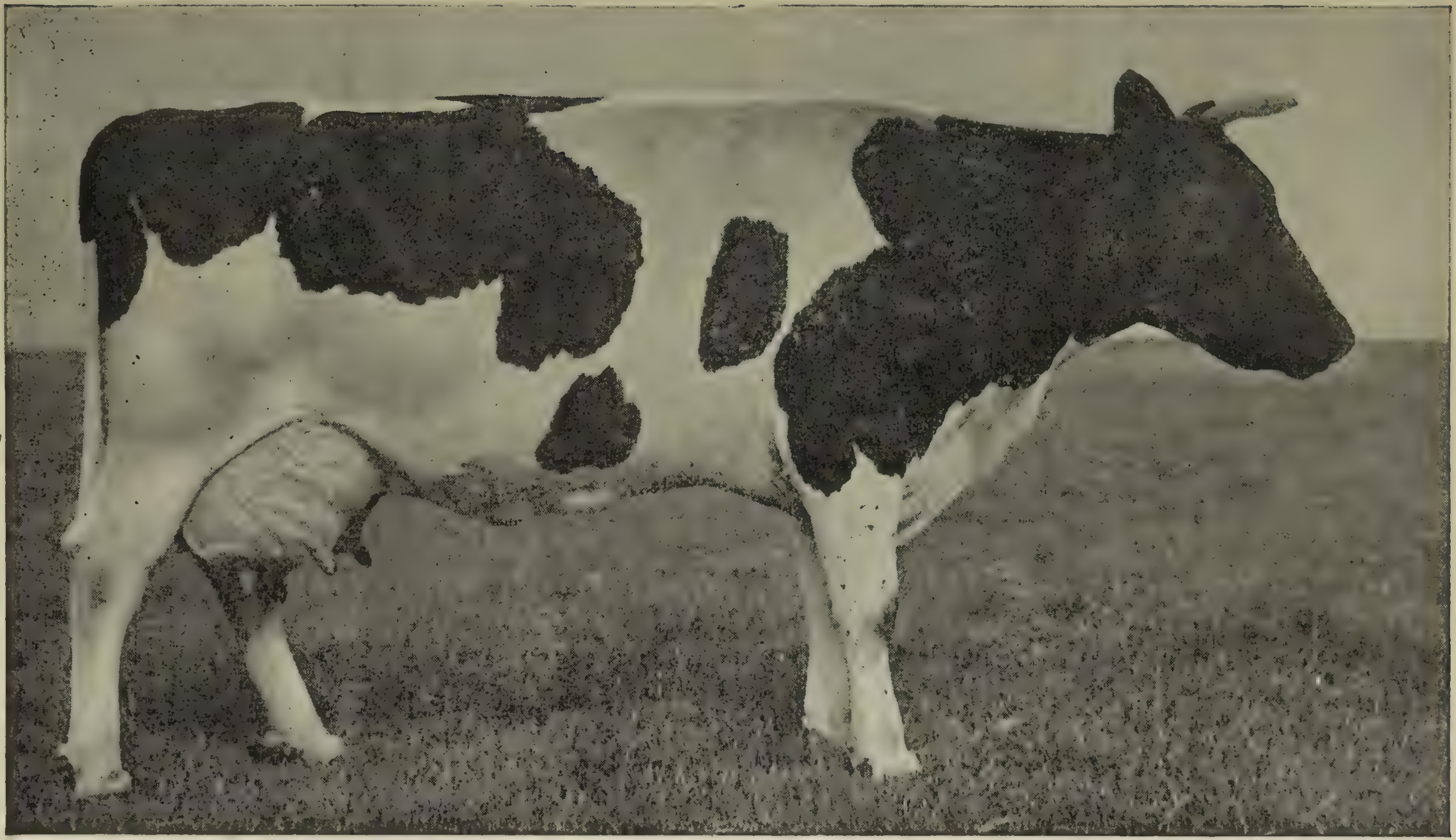
1. The black and white Friesland and Holland cattle.
2. The Groninger whiteheads.
3. The red and white Rhine-Meuse and Yssel cattle.

The first of the above-mentioned breeds is the most widely distributed and the best known. The best of this breed is to be found in the provinces of Friesland, North Holland and a part of South Holland, whilst from these districts it has spread to other parts of the country, where particular breeds are more and more raised and not infrequently the black and white Friesland or Holland breed is preferred.

This breed is particularly renowned for its large yield of milk, and for this reason it is met with almost all over the world. Not only have several European countries used this breed for the improvement of their own cattle or are doing so at the present time (the breed has spread to a great extent in Sweden, the eastern provinces of Russia, Northern Germany, Poland, Austria and Hungary, Belgium, France and Italy, whilst it is also appreciated in England, Spain and other countries) but Netherlands cattle have been or are exported to other parts of the world (the United States, Argentine, Brazil, South Africa, Japan and Australia) to stock according to circumstances on larger or smaller areas.

In appearance this breed approaches the ideal, i.e. cattle in which an extreme development of the milk production is combined with sufficient bodily strength and fitness for fattening purposes.

In general the cattle are fairly big, somewhat lean in appearence and often longlegged; the hind quarters are well developed and the forequarters narrow in comparison. The body is fairly long, apparently not always to advantage in the head, neck and back. It cannot be denied that there is some tendency to late maturity and long legs.



Black and white cow in North Holland.

According to Van den Bosch [1]) the following measurements (in centimeters) may be taken as normal:

	Length of trunk.	Height at shoulders	Height of rump.	Depth of breast.	Width of breast.	Width between hips.	Width of pelvis.	Length of croup.
Full-grown cows........	168.0	135.7	138.5	72.9	44.9	56.4	51.3	54.3
Two-year-old bulls	172.4	142.2	144.0	75.8	49.0	54.6	53.4	56.1

The quality may be considered as fine. The hide is thin and supple and covered with fine glossy hair, so that the features of the head and joints are sharply defined. The udder is large and square and rises far under the belly. The teats are large. The bending lacteal veins, which lose themselves in the milk cellules under the breast, are exceptionally developed.

Although the breed shows a satisfactory uniformity of type, there are several differences to be observed upon further investigation, resulting from difference in soil and habits, and from systematic breeding from a particular type.

Perhaps also in some districts the type is influenced by crossing of breeds at some earlier period.

For example, the cattle on the prime meadowland of Holland are in general somewhat larger and less fine than the cattle in Friesland. On the islands of South Holland the animals have a tendency to mature early, and this results in short legs and greater depth and plumpness. This is undoubtedly due to the rich feeding and the late calving. On the lighter soils in the East and South of The Netherlands, and in the districts where breeding for milk purposes has been exaggerated, the defects are more evident, and badly-placed shoulders, defective gait and weakly-built bodies are no exception. But the breeding of these black and white Friesland-

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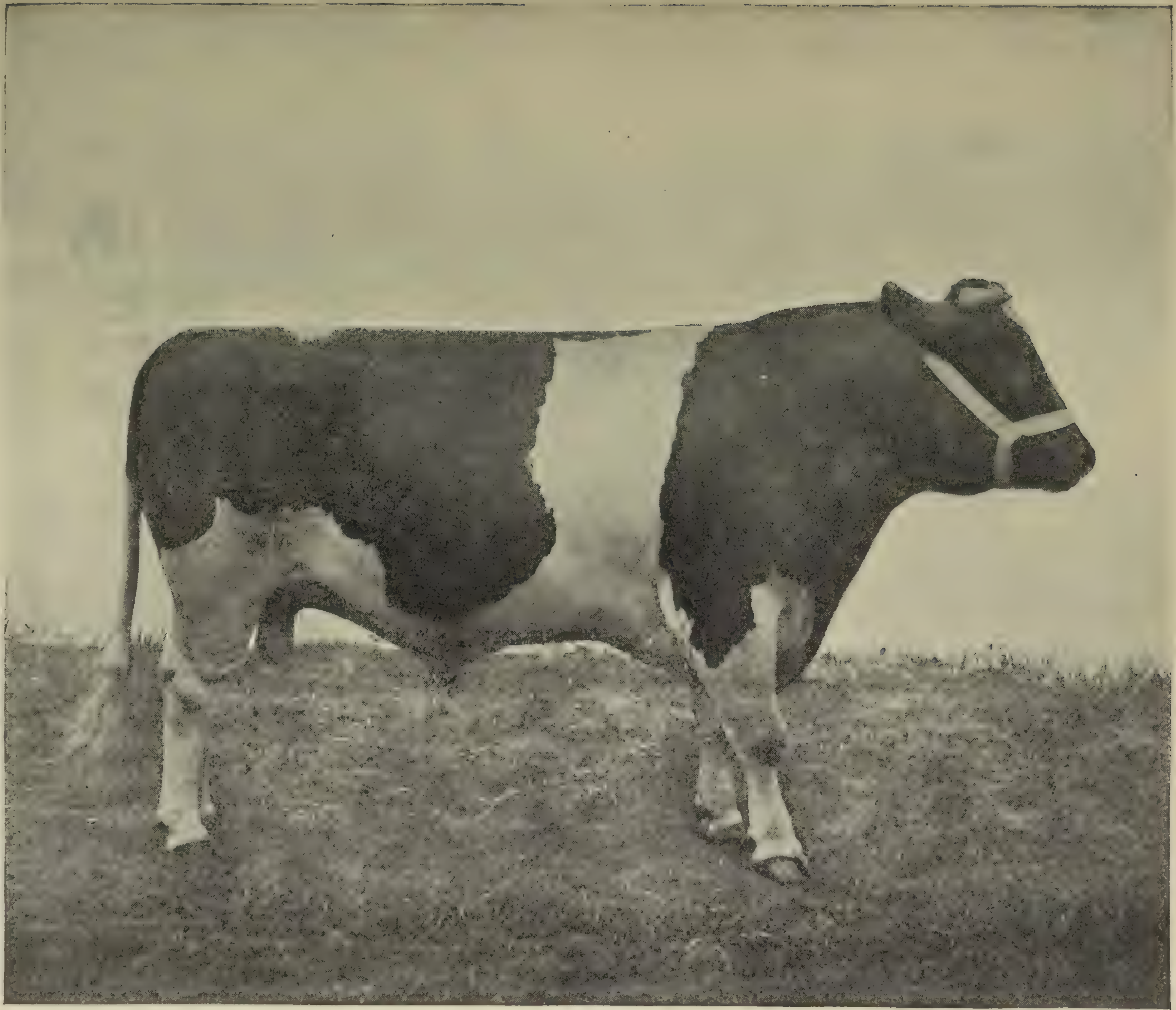
[1]) Abridged Report on the Conditions of Cattle-breeding in The Netherlands.



The red and white Meuse-Rhine-Yssel breed.

Holland cattle in these parts is not impracticable, as is evidenced in various centres on the light soils of Friesland, Gelderland, Overyssel and Drenthe, where in addition to the necessary care in feeding and nursing selection of breed has at the same time been adopted.

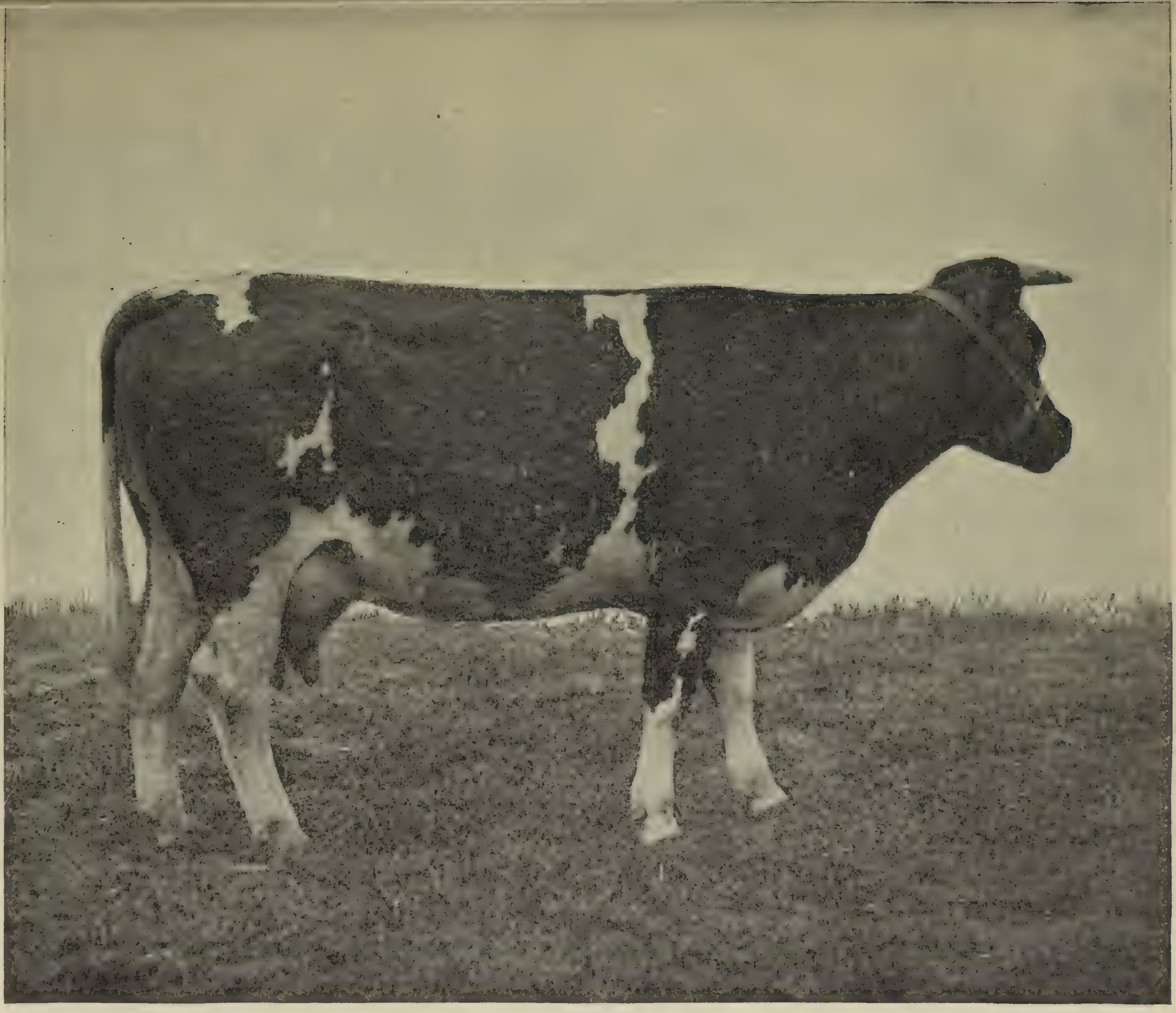
One must not miss this opportunity of drawing particular attention to the cattle of the light soil districts. It is universally known throughout The Netherlands that, where such cattle are transferred to better ground, they develop in an extraordinarily favourable manner, and it appears to me that the good breeding centres of the light soil districts are destined to provide good cattle for other districts of a similar nature. Foreign countries also, in so far as they are not able to offer the Netherlands cattle similar conditions as prevail in the polders of The Netherlands, can perhaps be served better from the lighter soils. At present, however, the number of first-class breeding cattle on the light-soiled districts is limited.

The colour of the hair is black and white. In Friesland the red-and-white is also recognised as pure-bred. Both colours are, however, bred separately, and the red are much fewer in number

Great diversity in the markings of the hair is to be seen, there being sometimes more black, sometimes more white. In the latter case the black has a tendency to spread itself over the body in freakish lines. In exceptional cases one speaks of tiger markings Most breeders prefer the dark colour, and therefore this is the more common. Wholly black animals are however not desired, but rather those with a large white circle on the shoulders and the loins. Neck and head are completely black with a white forelock, whilst white legs up to just above the knees are preferred, and the belly, udders and tip of the tail are always white. Black and white teats on the other hand are preferred.

The yield of milk varies according to the individual disposition, food and rearing.

A number of cases of animals, which in one lactial period gave 17,600 and more lbs. of milk, has been recorded, but the average is much lower. Thus the Provincial Com-



The red and white Meuse-Rhine-Yssel breed.

mittee of Cattle Breeding in Friesland, where the control of milk is fairly general and where numerous statistics are available, gives the average for various heavy soil districts (calculated from animals with a fat-percentage of 3.15 and more) as 9,900 to 10,800 lbs., from cows of 4 years and older; 7,700 to 8,800 lbs from 3 year-olds (2nd calving) and 6,380 to 7,480 lbs. from two-year olds. For districts with mixed soils these figures were respectively 9,240 to 9,900, 7,040 to 8,140, and 6,160 to 6,820; and for the sandy soils about 5,500, 6,600 and 8,800. The percentage of fat is best seen in the following table compiled by D. J. de Jong from all the average percentages of cattle in the Friesland Cattle Herd Book of 1911:

35	cases	with less than	2.50	average	fat	percentage
79	„	„	2.50–2.59	„	„	„
130	„	„	2.60—2.69	„	„	„
577	„	„	2.70—2.79	„	„	„
601	„	„	2.80—2.89	„	„	„
818	„	„	2.90—2.99	„	„	„
995	„	„	3.00–3.09	„	„	„
1,102	„	„	3.10–3.19	„	„	„
955	„	„	3.20—3.29	„	„	„
847	„	„	3.30—3.39	„	„	„
589	„	„	3.40—3.49	„	„	„
498	„	„	3.50–3.59	„	„	„
314	„	„	3.60—3.79	„	„	„
67	„	„	3.80—3.99	„	„	„
50	„	„	4.00 % and higher.			

In other districts there are not so many figures available. Probably, as not so much general attention is given to the milk production as in Friesland, the figures, especially of the percentage of fat, will be slightly lower.

Although considerably less known than the black and white cattle, probably owing to the fact that they are bred in a comparatively small area and because they possess a less one-sided serviceable value, the Groninger cattle have a reputation for several good qualities ¹).

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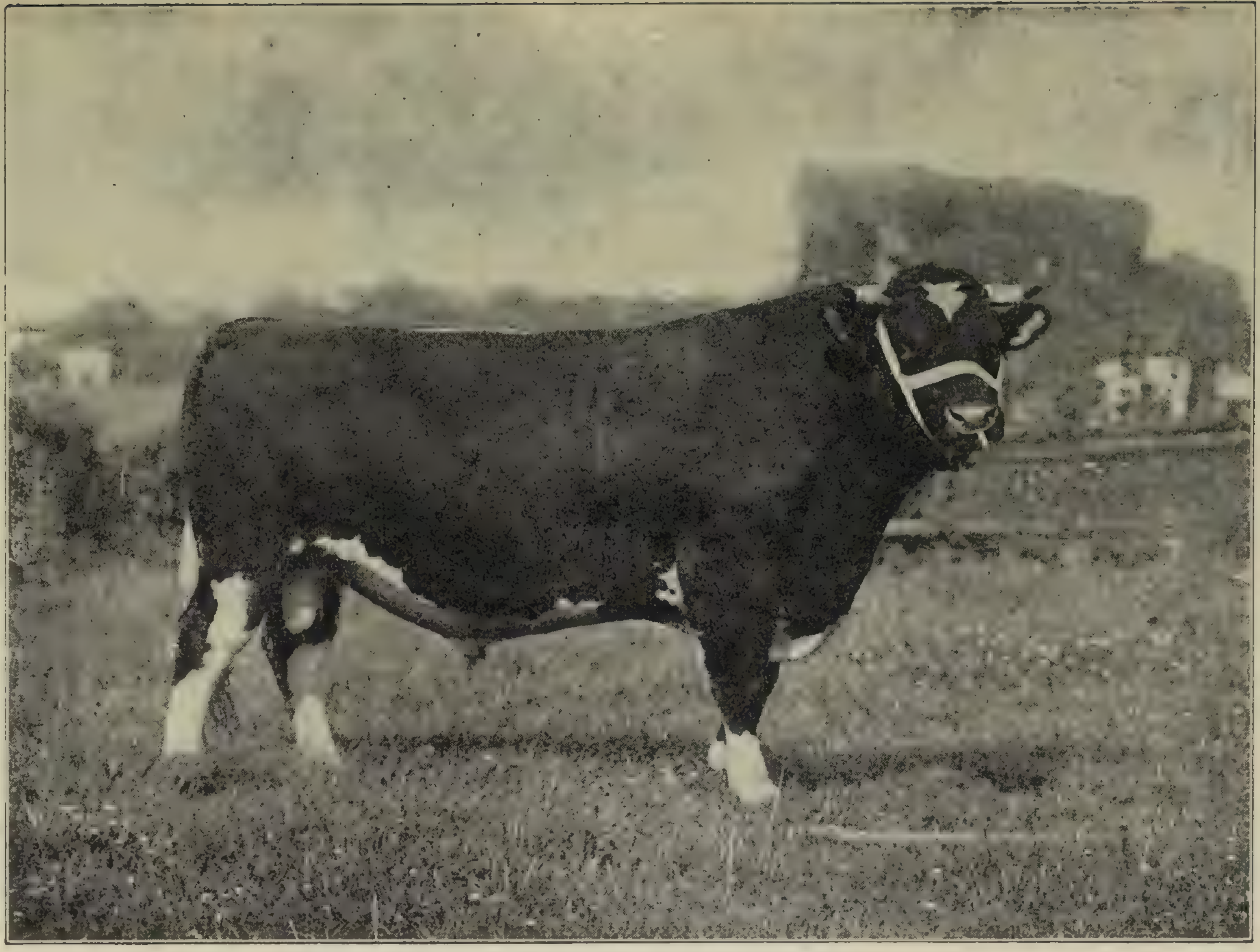
¹) Not long ago a monogram on this breed was published by S. Rooda.



Red and white Meuse-Rhine-Yssel bull.

The breed is so exceptionally characteristic that once seen it can never be forgotten. The first remarkable feature is the colour. The entire body is black with the exception of the head, which is white. The line between the black and the white can usually be drawn from the horns straight downwards between the eyes and the ears. Generally the eyes lie in a black field, which may or may not be connected with the black of the neck.

A second white field is found under the breast between the front legs, which extends to the udder. The latter is sometimes partly white with black teats.

The lower legs as far as the pastern or half way up to the knees and stifle are white.

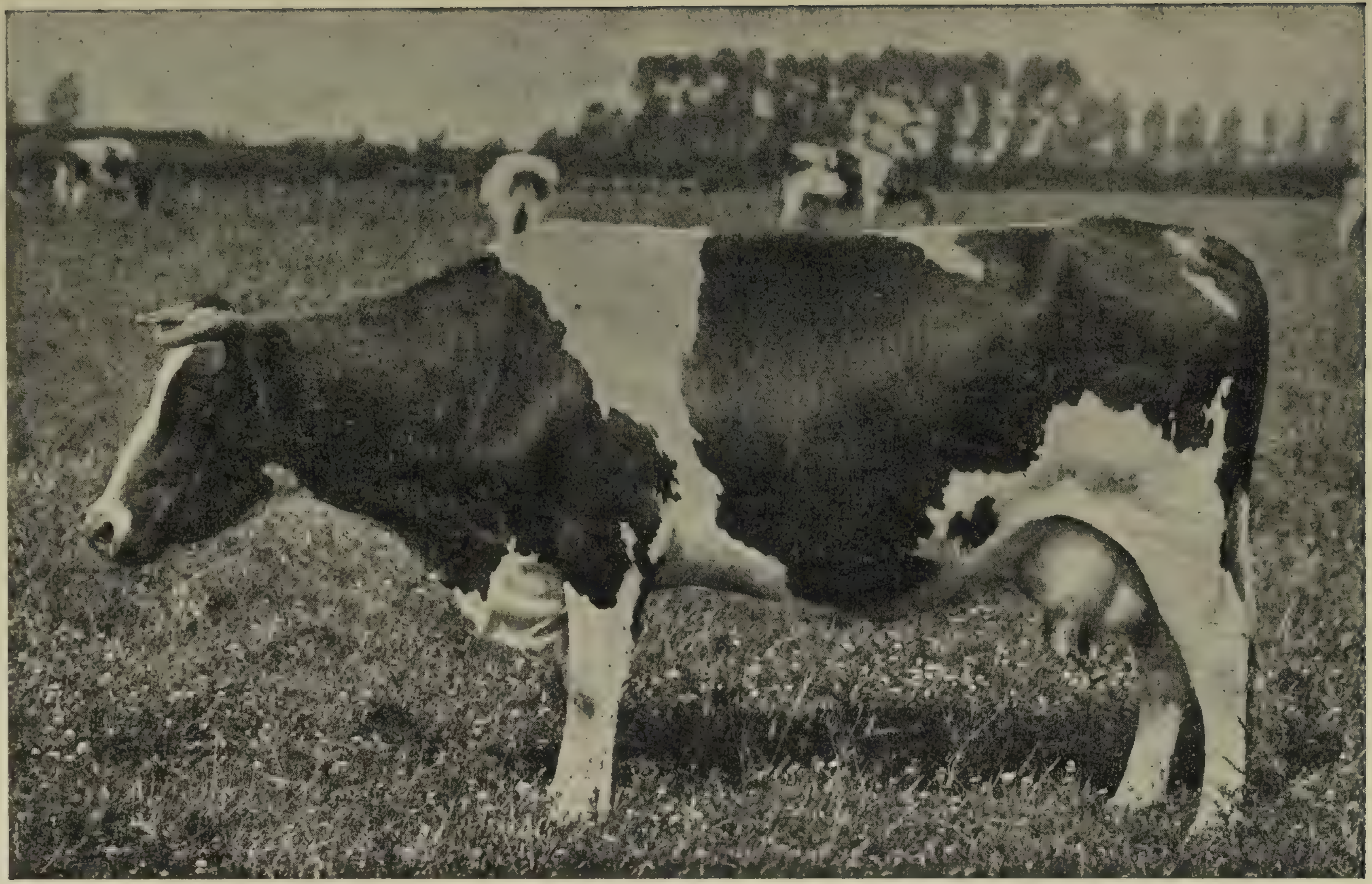
A few specimens of red with exactly the same markings occur.

The only district to which a considerable number of animals for breeding purposes is sent is the Rhine district of South Holland, where for years and years cattle suitable for fattening have been required.

The Groninger cattle is further distinguished by a typical build of body, and of the three different breeds of Netherlands cattle, this one is most uniform in type, and is characterised by fleshiness and roundness of the body. There is a certain fineness of the carcass, which is however no sign of weakness.

The type is medium in size, being smaller than the black and white cattle; the body is however deeply set and has strong fleshy back and loins. The rump is flat and square. The ischia are somewhat highly placed, resulting now and then in long and weak tendons. The thighs and gaskins are very fleshy, not round but flat from behind. The bones are short and fine and the joints sharply defined. The short and well-shaped head is very characteristic, but in the case of the bulls, which in general are larger and coarser than the cows, it is not so fine. The neck is moderately long and broadly set on the deep shoulders. The shoulders are sometimes loose. The hide is somewhat thicker, yet at the same time supple and elastic.

As the whole type is disposed to fleshiness, the udder is



Red and white Meuse-Rhine-Yssel cow.

not so large and is usually not so well placed as in the black and white cattle. The teats are often somewhat prominent.

Some 7,700 to 8,800 lbs. per year may be taken as the average yield of milk for full-grown cows. There is no doubt that this type in the hands of skilful breeders is capable of developing qualities which put many other types in the shade. It is, however, in danger at the present time of being supplanted by the black-and-whites, which are richer in yield of milk.

Van den Bosch [1]) gives the following normal measurements (in centimeters):

	Length of trunk.	Height at shoulders	Height of rump.	Depth of breast.	Width of breast.	Width between hips.	Width of pelvis.	Length of croup.
Full-grown cows.......	165.4	133	134.9	72.2	45.7	56.3	52	54
2-year-old bulls.......	170.8	140.5	142.9	75.5	50.0	55.7	54.3	56.2

J. G. J. van den Bosch has grouped together, under the name *Meuse-Rhine-Yssel Cattle*, the red and white cattle which are met with in the eastern and southern districts of the country, and along the rivers, whence they have spread over the neighbouring sandy districts.

There has been much inter-breeding of races in the said districts, and it must not be expected that this type is generally met near the river.

The purest specimens of the type are found in the Yssel district to the north of Deventer and in the district of Cuyk to the south of the Waal near Nymwegen.

Moreover, of late years this race has been bred in Limburg and a few other places, on both clayey and light soils.

The type is more closely allied to the Groninger than to the Friesland-Holland cattle. It appears to accomodate itself

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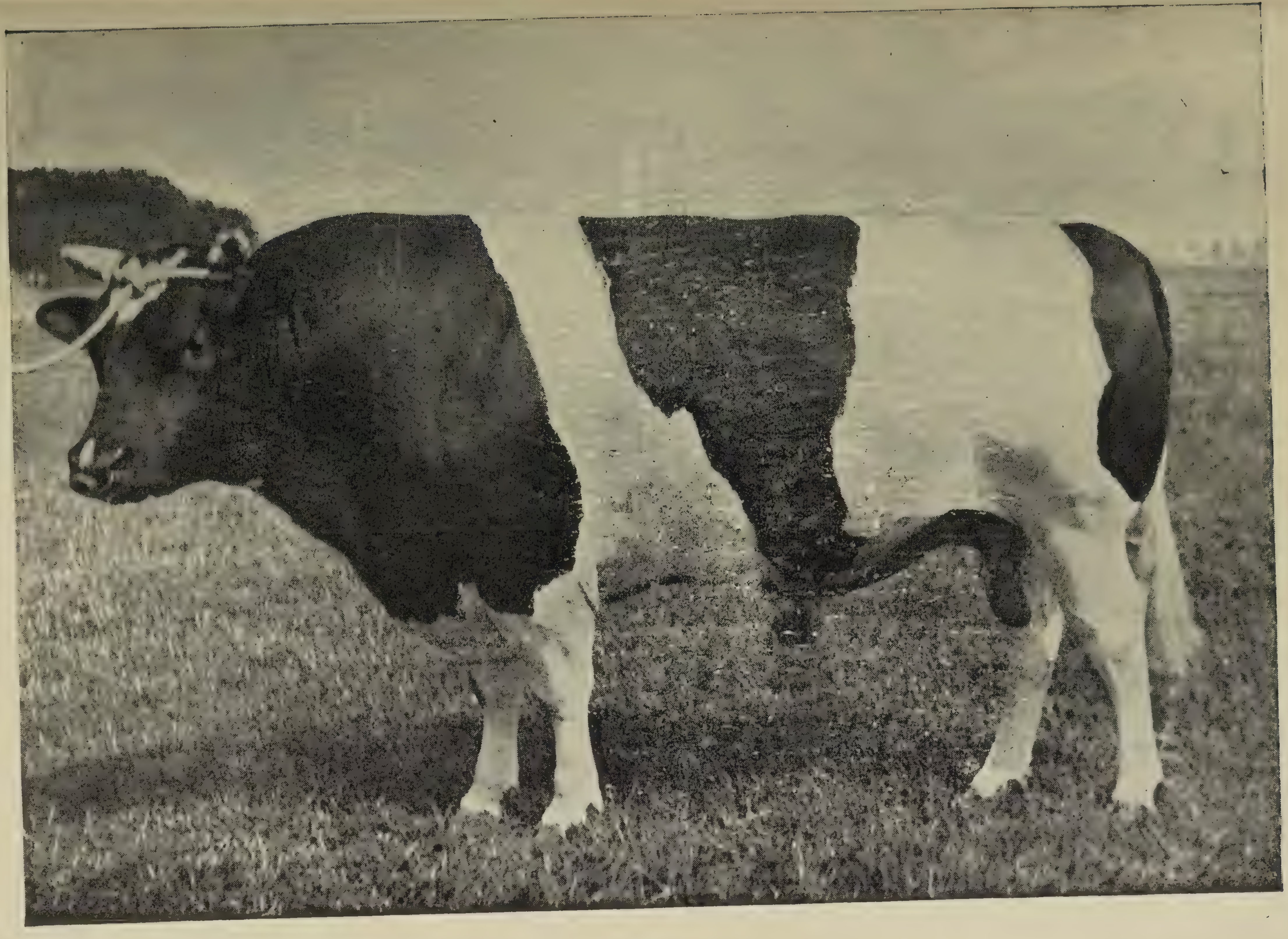
[1]) Abridged Report on the Condition of Cattle-breeding in The Netherlands.



A Friesian bull.

to the soil fairly well. It attains its best development on the heavy clay land near the rivers. The animal is very broad and short-legged; the milk yield is sufficient, and the best specimens answer the highest requirements for either milk or fattening purposes.

The colour is a brownish red, a chestnut head being preferred with a body of a lighter shade; head, short and broad; horns often heavy; neck not too long and well set in the excellent and deep forehand; ribs deep and round, often however short; sloping sides; a broad tail-head, which is set rather far forward, is frequently met with. The fleshy thighs are often round, whilst the udder projects. The udder, although well developed, does not give the same impression of richness in milk as with the black-and-whites, as it is not infrequently hairy or has the teats close together. The milk productiveness is satisfactory otherwise.

The average yield of milk in cows of triple breeding societies in the province of Overyssel in the years 1910 and 1912 is as follows:

1910.

Age.	Number of cattle.	Lbs. milk.	Fat %.	Lbs. butter.	Days.
2	96	6,321	3.23	230	303
3	75	7,682	3.17	274	304
4	61	8,668	3.20	312	305
5 and more	137	9,244	3.13	326	292

1912.

2	85	6,879	3.27	254	315
3	87	7,643	3.17	273	301
4	66	8,589	3.22	311	301
5 and more	125	9,489	3.18	340	302

The average yield of milk of 1,072 cows in the province of Gelderland in the years 1909—1912 was as follows:

Yield of milk	9,156 lbs.
Lbs fat	295
Percentage of fat	3.22
Days	310

As normal measurements (in centimeters) Van den Bosch gives:

	Length of trunk.	Height at shoulders.	Height of rump.	Depth of breast.	Width of breast.	Width between hips.	Width of pelvis.	Length of croup.
Full-grown cows.......	163.7	127.8	130.1	70.2	44.3	54.1	48.7	52.1
2-year-old bulls.......	165.3	134	136.1	72	47.1	52.7	51.7	54

III. STATE REGULATIONS IN THE INTEREST OF CATTLE BREEDING.

In many ways cattle-breeding is directly or indirectly served by the State.

The basis of all progress is the high standard and wide undertaking of agricultural education.

A second branch of the State's interest in cattle-farming is the **Veterinary Service** [1]).

The veterinary control regulated by the law of 1870 is in the hands of 14 District Veterinary Officers, with 160 substitutes assisted by the local magistrates and police, whilst the Department of Agriculture appoints an Inspector for the Veterinary Service.

Contagious diseases are boldly coped with, with the result that most of them have either entirely disappeared or are confined to a few isolated cases. The labours of the State Serum Institute at Rotterdam have been of great importance in this connection. This institute, in addition to the preparation of all kinds of serums, has proved of great service, along with the State Veterinary School, in conducting scientific investigations [2]).

The only cattle diseases which are still a cause of anxiety are tuberculosis and foot and mouth disease.

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[1]) See reports of the State Veterinary Control.

[2]) See Annual Reports of the State Serum Institute published by the Directory of Agriculture.

As third branch of the State's interest must be mentioned: **The measures for the promotion of the bona fide export trade.**

Different articles of export are submitted for examination to State officials, or are at any rate accorded a guarantee as to quality or genuineness with the help and knowledge of the State.

In the first place the control of butter is worthy of mention, and by this means a sharp distinction is drawn between butter and margarine, and Netherlands butter, which had at one time lost its good name, has once again been restored to honour.

Further, a control of cheese has also been in operation for some time past.

By Royal Decree of the 21st November, 1902, a facultative service for the examination of meat destined for exportation was instituted. The law relating to the exportation examinations of 1907 gave the Crown the authority to prohibit the exportation of unexamined meat to certain countries.

Since 1909 the Government gives facilities to test cattle destined for exportation and to obtain an official certificate stating that the animals are sound and otherwise fit for export.

Direct support of cattle breeding has for a long time been given by various provinces, and since 1898 by the State also. In the latter year the subsidy for cattle breeding amounted to $ 12,000.— (fl. 30,000), which amount has now risen to more than $ 30,000.— (fl. 75,000). Of this about $ 8640.— goes to the Herdbooks, $ 960.— in competitions for the improvement of cow-houses, whilst about $ 19,200.— is placed in the hands of the Committees for Cattle-breeding, one of which exists in each province.

The above-mentioned Committees manage the provincial subsidies also and a few private contributions, so that a total of about $ 42,000.— is available each year.

The duties of the provincial Committees are set forth in the Regulations Governing the State Support of Cattle Breeding in the Royal Decree of 2nd April, 1907.

IV. SOCIETIES.

As a result of the State support, societies in connection with cattle-breeding are rapidly increasing.

In the first place two great Herdbook societies exist, viz. the Netherlands Cattle Herdbook, and the Friesian Cattle Herdbook. In addition to these there are the North Holland Cattle Herdbook and the Groningen Cattle Herdbook, neither of which however is as yet recognised by the State.

The Netherlands Cattle Herdbook was established in 1874 and thoroughly reorganised in 1906. Its sphere of activity extends over the whole country, with the exception of the province of Friesland.

Since the said reorganisation the Herdbook has been brought into line with the requirements of the present time. The three breeds mentioned above are recognised.

Animals, in order to be included, are submitted to a thorough examination, the result of which is given in the pedigree book, whilst at the same time the measurements are taken, and, subject to certain conditions being fulfilled, milk statistics are also noted in the pedigree book.

By means of certificates of serving and birth the animal is recognised as pure-bred.

A special book is kept at the Central Bureau, Kanon Straat, The Hague, of every breed. Cross breeds of course are not entered.

The Friesian Cattle Herdbook, established in 1879, has always had the advantage over the Netherlands Herdbook. Working in the midst of a real cattle-breeding province with a fairly pure native breed, it has from the very beginning taken pure stock as its foundation. The great interest shown by breeders in the Herdbook has permitted of its being strictly consequent in the requirements of such a book and in keeping it up without any financial burden. This pedigree book has therefore become more and more a model worthy of the admiration of all experts.

A number of local societies have also been formed in the last 15 years, the first according to a Danish model. These societies are a useful and sometimes indispensable complement of the small and moderate farms so general in The Netherlands. The formation of such societies is strongly recommended by the Committees for Cattle Breeding.

With the local societies a distinction must be made between:

1. Bull societies, whose object is to regulate bull-keeping according to requirements. These societies are to be found in all parts of the country, and not infrequently in the districts where cattle-farming is in its infancy they are the first step in the right direction. Generally, good and pure race bulls are bought. In districts where cattle-farming is extensively carried on, these societies are more for the purpose of co-operation in the cost of maintenance of a first-class bull, the common advantage also being that as many a good bull is the property of a society it will not be exported.

2. The Control Societies. These have the milk produced by the cows of the members regularly examined by a competent Controller.

3. Breeding Societies generally spring from Bull or Control Societies. They exercise the functions of both the above-mentioned kinds of societies, and in addition keep registers of breeding and young cattle and promote regulations conducive to the common interest.

At the end of 1914 the following societies were in active operation:

	Bull.	Control.	Breeding.
Groningen	13	10	10
Friesland	53	102	6
Drenthe	85	14	5
Overyssel	53	8	17
Gelderland	25	10	46
Utrecht	1	2	16
N. Holland	5	3	29
S. Holland	6	4	41
Zeeland	22	12	3
N. Brabant	84	1	23
Limburg	44	—	4

V. CATTLE FARMING IN VARIOUS PROVINCES.

The table on the next page will, together with the one found on page 20, help to show the different kinds of farming in the various provinces.

The following notes on the separate provinces will also be of service:

Groningen.

This flourishing province, of which the University and business town of Groningen is the centre, although the cradle of one of the three Netherlands breeds of cattle, is more renowned for its tillage than for cattle breeding. In the well-known "Veenkoloniën" (Fen districts) cattle-farming is of little or no importance, and in the clayey districts the great occupation is the growing of crops. Only on the heavy clay soil along the Reitdiep, to the north-east of the town of Groningen, is cattle-farming the main industry. It also occupies an important place in the neighbouring "Westerkwartier", but is in general of secondary importance in the gravel districts to the south and east, extending from the Lauwer Zee to the Dollard.

Horse-breeding and sheep-farming are fairly important.

The district is known for its fairly large farms from 30 to 50 H.A. and more; a great part of the farmers are also the land-owners.

Corn growing has in the last few years considerably increased, thanks to the high prices for straw for the manufacture of cardboard.

In the southern diluvial parts of the "Westerkwartier" and Westerwolde, cattle and pig-farming are of more importance; these districts, however, only include a small area of the province. Dairy produce has developed in various directions, according to the nature of the cattle and the peculiarities of the trade. The quantity of butter from dairy factories in Groningen in 1910 fell short of 4,400,000 lbs., whilst the production in the neighbouring province of Friesland amounted in the same year to 33,000,000 lbs.

	Number of cattle 1910.	Comprising			Number of cattle per 100 hectares of cultivated land.	Production of Butter		Production of Cheese	
		Milch Calving.	Fattening Cattle.	Young Cattle.		in dairy factories (Kilos).	on farms (Kilos).	in dairy factories (Kilos).	on farms (Kilos).
Groningen	106,655	46.4 %	6.9 %	46.7 %	55	1,941,591	525,400	888,088	—
Friesland	306,574	55 8 „	2 4 „	41 8 „	114	14,985,100	191,700	28,585,000	—
Drenthe	96,197	53.9 -	1.0 „	45 1 „	80	3,823,810	194,600	—	—
Overyssel	180,781	59.3 „	2.8 „	37.9 „	92	4,616,501	2,867,400	817,569	67,800
Gelderland	283,278	43.5 „	8.2 „	48.3 „	97	6,077,425	1,915,100	116,297	266,700
Utrecht	131,083	59 0 „	2.7 „	38.3 „	138	641,182	778,400	76,828	13,477,500
N. Holland	204,532	63 8 „	7.6 „	28.6 „	103	1,437,671	1,679,000	9,843,730	9,316,800
S. Holland	302,813	60.2 „	6.8 „	33 „	127	2,929,529	3,032,000	1,634,987	18,720,900
Zeeland	83,800	31.7 „	4.9 „	63.4 „	57	191,280	1,610,600	47,413	4,500
N. Brabant	225,932	56.1 „	3.7 „	40.2 „	80	6,497,904	3,791,400	57,811	—
Limburg.	105,297	57.3 „	5.0 „	37.7 „	81	3,126,508	1,751,300	—	—
The Netherlands	2,026,943	54 6 %	5.0 %	40.4 %	94	46,268,501	18,337,100	42,117,723	41,854,200

The rearing of young cattle is very great in comparison with the number of full-grown animals. The female calves are for the most part reared, whilst the male calves are generally castrated and fattened.

This extensive rearing of young cattle is neutralised by a large sale of 3 to 5 year old cows, principally to South Holland. The oxen and also a part of the young cows are fattened and stalled. Fattening is not done so much as formerly, when more stable-manure was required.

The best specimens of typical white head cattle are met with in Hunsingo and the northern part of the Westerkwartier. To the south and east there are more black and white cattle resembling the Holland and Friesian cattle.

The trade conditions are such that breeding is not of much importance, although of course there are some exceptions. Older bulls are not often stocked. Pedigree registration is not by any means general, and the number of breeding, control and bull societies is far behind that of other provinces. In the last few years things have improved, and it is more old customs and lack of interest than want of capital that stand in the way of further progress.

Friesland ¹).

In contrast with Groningen, cattle-breeding is the main point in this province.

The eastern part of the province consists of sandy land of varying fertility, mostly utilised as grass land.

This comprises about one third of the province and is bounded by a narrow strip of heathland, which becomes wider towards the south. This heathland has been brought into cultivation during the last century and become exclusively meadowland.

These heathlands are bordered by heavy clayey soil, which is also converted into grass land. There are places where no arable land is seen.

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¹) A more complete description is to be obtained in either English, French or German from the "Landbouwconsulent voor Friesland", Landbouwhuis, Leeuwarden.

A farm with black and white pedigree cattle in Friesland.

Along the coast to the north of the railway line from Leeuwarden to Franeker there is more mixed farming; potato growing is the principal point, with some corn towards the east. However, in this district cattle-farming is also of great importance.

Friesland is fertile but comparatively thinly populated. The tenancy system prevails, and agriculture is about the only industry. In Leeuwarden, the capital of the province, there is a very important cattle market every Friday, where 80,000 to 100,000 head of cattle, two-thirds of which are full grown and the rest young beasts, are dealt with yearly. Dairy farming and the sale of cattle for breeding and other purposes is the sole occupation of the whole of the province. Fattening is quite a secondary matter.

The cows calve from January to April. The bull calves are for the most part slaughtered whilst still young (about 17,000) and also a number of the female calves. Others are reared and offered on the market in autumn as "grass calves", and if there is a demand for them they are exported, otherwise they find their way to the slaughter houses. A regular clearance of cattle takes place, but not so much as in Groningen. A good breeding animal is kept as long as possible, but a young cow that does not come up to expectations is promptly slaughtered. There is a continual movement of cattle from the North of The Netherlands in a southern direction. The surplus cattle of Friesland are sold to Holland and Utrecht, whence they are exported to Brabant and Zeeland and partly to Belgium.

The Friesian breed has been kept pure and is a source of national pride.

This purity of breed still forms the basis of all improvement in stock, which is nowhere better than in this province. The efforts to improve the stock are partly owing to the demand from abroad (originally America and Germany, later Russia, Sweden, Poland, Italy, S. Africa, Brazil, Japan and other countries) and partly to the interests of butter-making.

The dairy factories brought about the delivery of milk by weight and according to percentage of fat, and it was soon evident that heredity had a great influence on the productive powers. The first Control Society was established in 1899, and in 1912 there were 102 such societies. It may safely be assumed that at the present time the milk from 60,000 to 80,000 cows is regularly controlled once a fortnight.

Efforts are being made to obtain a powerful build of body without loss of "nobility". If the exterior and productive capacity reach a fairly high standard, importance is also attached to the pedigree and qualities (percentage of fat) of the ancestors.

The blood of bulls that have done specially good service is very much in demand, and it will not be long before a few of the better stocks have supplanted the rest.

The farms are moderate in size, about 30 hectares being regarded as out of the usual, and on such a farm there are about 25 to 30 milch cows, 10 one-year-olds, and 10 calves. In the districts where the land is arable the stock is not so numerous.

Grazing begins in the end of April. About two-thirds of the land is used for one hay crop and afterwards given over to the cattle. The hay and ensilaged grass form the principal part of the winter feeding. It is supplemented with from 1 to 3 kilograms of linseed cake or other concentrated food according to circumstances. A certain quantity of beet, pulp and, in the arable districts, straw is also used. About two months before calving the cows are set out of milk.

The calves are born for the most part in February and March and are usually brought under very primitive cover and fed with full milk for a short time (3 to 4 weeks), which is afterwards partly replaced by butter-milk and whey, to which meal and hay is added, whilst in summer full advantage is taken of the pasturage. They are served at one or $1^1/_2$ years of age and reach their full development at 4 to 5 years of age.

North Holland affords an abundance of varied and peculiar conditions. With the exception of the Gooy to the south-east of Amsterdam, which consists of diluvial sand, within the stretches of dunes, a ground formation is met with

Black and white pedigree cattle in North Holland.

which in some respects may be compared to that of Friesland. The whole province is low-lying and artificially drained, and being a narrow strip between two seas it has a somewhat milder climate than Friesland, so that the grazing time lasts a little longer. In the grass polders (Beemster, etc.) we find excellent meadowland, and the tillage polders (Y, Haarlemmermeer, Anna Paulowna, etc.) are also very fertile, whilst crop-growing is highly developed.

Gardening occupies a much more important place here than in the Northern provinces. Trade and shipping have caused large towns to spring up, and the consequent development of industry, so that the population is denser. Where in Friesland there are 118 cattle to 100 hectares of land or 845 per 1,000 inhabitants, in North Holland these figures are respectively 103 and 185.

The result is that a large part of the milk is required for local consumption, whilst the calves are mostly slaughtered, quite young. Milch cows are bought. There is certainly no other province where so many kinds of trade in cattle exist as here.

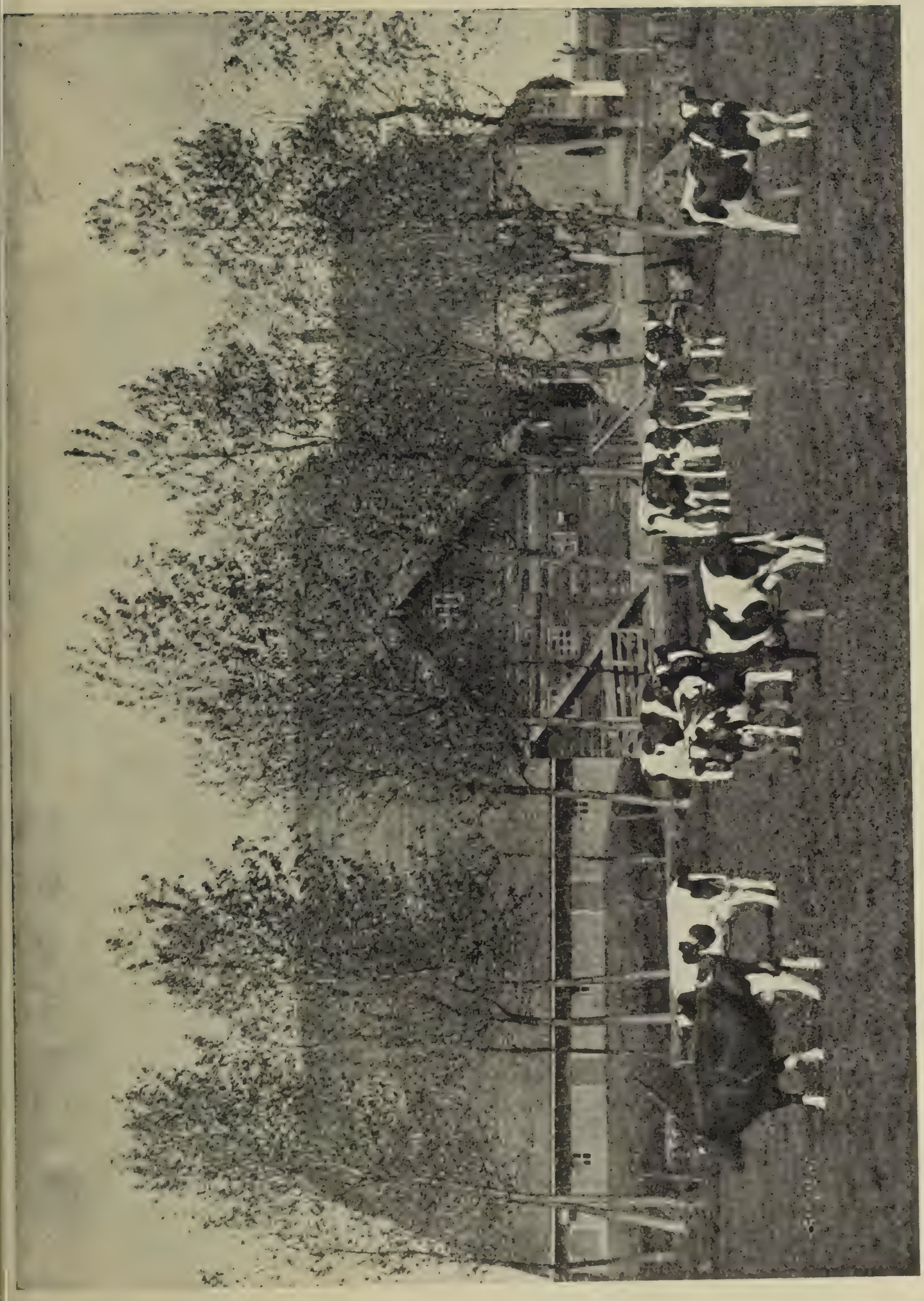
The extraordinarily fertile meadowland and the close proximity of the towns make cattle fattening imperative, and this is still an important industry.

Further, North Holland is a cheesemaking land more especially of the "Edammer Cheese", which is made from partly skimmed milk. This industry is carried on for the most part on the farms or in comparatively small factories. The farms are somewhat smaller than in Friesland.

The great incentives to progress, which we have noticed in Friesland, do not exist here in so great an extent. Yet in the last few years, especially in the North of the province, breeding has considerably improved, and in this the Herdbook and breeding societies have been of great service. Black and white cattle of a similar type to the Friesian are bred.

South Holland.

This province also presents great variety, but on the whole it may be compared with North Holland. Here also



A farm with black and white pedigree cattle in South Holland.

there is a dense population (towns, gardening in Westland, Zwyndrecht, and Boskoop) whilst there are a large number of distilleries which yield a large quantity of food for the cattle. In these districts in consequence the number of cattle is 5 or 6 per hectare. The province also contains margarine factories, which require a large amount of fresh milk. On the farms themselves there is a considerable amount of full cream cheesemaking (Gouda), which is generally coupled with pigfattening. On the islands to the south of Rotterdam there is an intense tillage, but cattle breeding also is an important factor. These islands are the cradle of the "South Holland Black and White Type", which is distinguished from the Friesian and North Holland type by a heavier build, which is also obtained by more intensive feeding and late calving. Fattening is also of importance here. On these islands of South Holland much progress has been made of late years, and although the bulls for breeding purposes are still partly brought from the Northern provinces, a provincial type is kept up.

To the north of the Meuse breeding is not of so much importance; signs of progress are to be seen however. The large number of cattle that have been imported from elsewhere or pass through on their journey southwards (Rotterdam cattle market is the biggest in the country) have left all kinds of traces behind. Thus in the district of the old Rhine, a trace of Groningen White Heads has crept in, so that a crossing of breeds has appeared.

Zeeland is a typically tillage province, and here the breeding of heavy horses flourishes. Cattle-farming, especially fattening and grazing, is of very ancient date.

In this province the traces of an old Germanic people remain, and the typical Friesian cattle that is found all over the north-west of The Netherlands was not originally to be seen here.

There were however different types located on the islands, e.g. the South Beveland cattle, but this breed has pretty nearly disappeared owing to the importation of Shorthorns blood and later crossing with the black and white

Friesian and Holland bulls. Fattening and breeding young cattle is the main object here, although of late years dairy farming and breeding of black and white cattle has begun to attract attention.

The Western alluvial district of *North Brabant* borders on the islands of Zeeland and South Holland. Sugar beet is largely cultivated here. The cattle stock is mixed, but shows some similarity to that of the South Holland islands. In the sandy districts of North Brabant the stock of cattle is fairly large, as is everywhere the case in sandy districts, and although butter-making is on the increase cleanliness is to some extent endangered by the manure-winning interests.

Very often the cows are seen stalled in two rows, between which there is a wide deep trench, where sometimes the dung remains heaped up for months at a time. In the summer the cattle are tethered on the grass and clover. One can hardly speak of actual cattle-breeding in Brabant. The provinces of Zeeland and South Holland to the South of the Meuse feel the proximity of Belgium, which is always demanding milch cows and cattle for slaughtering, but Brabant is in reality an intermediary station for the stream of cattle which we have already mentioned several times and which is detrimental to a rational system of breeding. In spite of the provincial regulation for the approval of bulls, breeding in Brabant is not placed high. Calves are fattened to a considerable extent in this province.

Along the Meuse there is much grazing; the clayey land of Cuyck, situated to the south of Nymwegen, makes a favourable exception to the rest of the province. To this district of Cuyck the red and white cattle are indigenous, and are somewhat larger and heavier but less uniform in build than in the Yssel district.

The neighbouring province of *Limburg* is a narrow strip through which the river Meuse winds. The southern part consists of diluvial clay, which is not met with elsewhere in the Netherlands. Arable land is much more in evidence than meadowland, but the stock of cattle is considerable and principally consumes products from the land under cultivation. Horses, pigs and poultry are of importance. Gardening and fruit-farming are also carried on. Traces of a former Roman colonisation are to be seen in the types of the houses and other peculiarities.

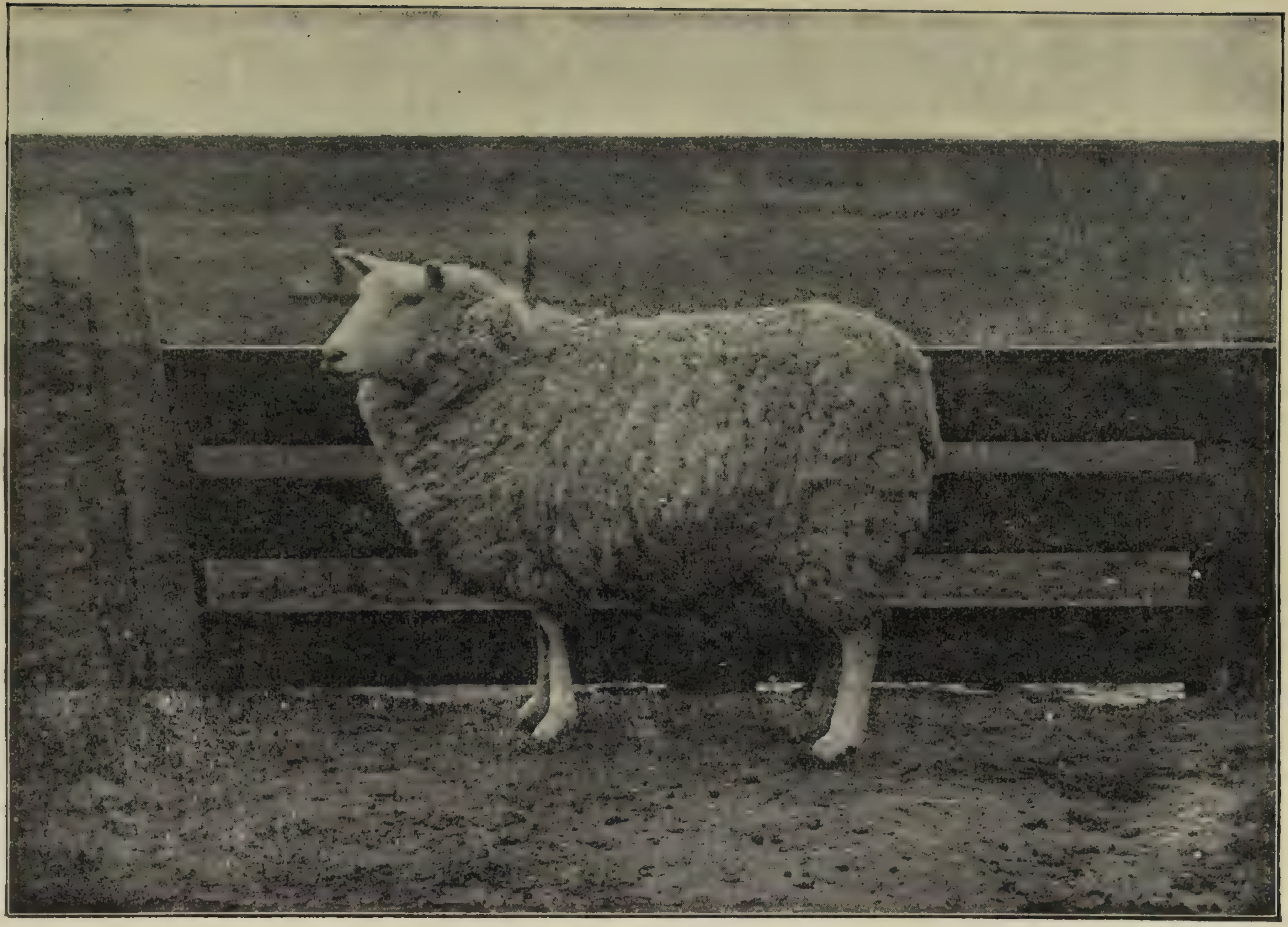
In North Limburg, which also consists of diluvial sand with a narrow strip of clay along the Meuse, and which is bounded on the west by the fens and "dalgronden" of "The Peel", arable land is more in evidence than grassland, although the produce of the land is used up by the cattle. The principle object of the cattle-farming is the production of milk, which is consumed in the dairies. Gardening is of a fairly considerable importance here. Both in North and South Limburg at the present time grassland is increasing in comparison with arable land. Although probably originally stocked with red and white Rhine-Meuse and Yssel cattle, the breeding had to begin at the beginning during the last decade.

Much activity is being displayed, and it is to be expected that very soon Limburg will constitute one of the breeding centres of the red and white M.R.Y. cattle.

Returning to the centre of the country we come to the province of *Utrecht*, which has the reputation for being the least progressive of the provinces of The Netherlands. The western clay and fen districts, which comprise about two-thirds of the province, are actually part of the South Holland meadowland.

The principal industry is the making of Gouda cheese on the farms. Breeding and fattening are of secondary importance.

The stock is mixed and principally recruited from the Northern provinces. Of late years a little interest is being manifested in breeding. In the south of the province, along the Rhine, there is more arable land, similar in nature to that of the Betuwe. To the North, by the Zuyder Zee, a fertile stretch of meadowland is met with. The eastern part of the province consists of sand and becomes part of the Veluwe. The ground is low and flat and is mostly pasture land. In



Ewe of the ennobled breed of the island of Texel (North Holland).

this the Utrecht sandy district differs from other sandy districts, because the farms here are of greater extent and, further, the milk is not worked in dairy factories, but is turned into butter and cheese on the farms. The breeding of pigs is of great importance.

The province of *Gelderland* is naturally divided into three parts.

The Veluwe, which borders on Utrecht, is the most picturesque but at the same time the least cultivated part of The Netherlands The hilly landscape is mostly covered with woods and heather and is used chiefly for shooting or sheep-farming. Only on the borders are fertile parts to be seen and there the farms are somewhat larger. Since the importation of artificial manure began, cattle and pig-farming have extended.

Between the Rhine and the Meuse lies the Betuwe, which is intersected by the Waal and the Linge, the old island of the Batavi. The ground consists of heavy clay. As a result of the soil formation and also of bad drainage, the cultivation of the land is not so good as in the clay districts by the sea. Fruit-farming is the chief occupation, whilst there is also much horse-breeding. An important branch of the cattle-farming is the fattening, 20 % to 30 % of it being of this description. Little of an original breed is to be recognised. There has been much crossing with foreign stock blood (Shorthorns, Groningen, etc.) and little attempt is made to breed a distinctive type.

"De Graafschap", the third district of the province of Gelderland, forms with the provinces *Overyssel* and *Drenthe* the eastern Saxon part of the country. This district consists principally of sandy ground, and the population, which not long ago was considered to be behindhand, has evinced an excellent faculty for adapting itself to the new times, so that tremendous progress has resulted. Different branches of industry have developed in the last century from the old home industries, so that these provinces, although lacking the rich soil of the alluvial districts of West Holland, have every ap-

A flock of sheep on the heath in North Brabant.

A sheep-fold.

pearance of being flourishing and progressive. As to agriculture, although cattle-farming is not equally good over the whole district, cattle and pig-farming are the chief occupation and not much agricultural produce is put on the market.

As far as possible the milk is made into butter in factories. Cheese-making is an exception. Fattening of calves goes on in conjunction with pig-farming. Small holdings are much in evidence and are supported by co-operation.

The cattle is of mixed origin and influenced by the peculiarities of the soil.

Breeding is in general carried on in conformity with local requirements. Here and there attempts are being made to improve the breed by means of breeding and bull societies.

Only a few districts demand special mention. In the first place the clayey land along the Yssel, where some similarity with the Betuwe is to be seen, but where breeding takes the place of fattening. The red and white breed has been kept pure here, and the breeders of red and white Rhine-Meuse-Yssel cattle draw their material from the small district between Deventer and Zwolle. Interest in breeding is increased by exportation of stock, but there is still room for improvement in various directions. The eastern and southern parts of Drenthe, which up to a short time ago consisted of marshy land, are now under cultivation, but cattle-farming is carried on as little here as in the corresponding parts of Groningen.

The northern part of Overyssel, on to which the eastern diluvial lands drain, is low and marshy. It is a typical grass district, which in addition to various products from dairy and pig-farming, puts a considerable amount of hay on the market. The cattle in this neighbourhood are chiefly black and white and partly of Holland origin. Much may still be done for the improvement of the trade and especially for the improvement of cattle-breeding, as in the southern part of Friesland.

FINAL REMARKS.

The foregoing remarks are but an attempt to give a hasty survey of cattle-breeding in The Netherlands. We hope, however, that it will be sufficient for those foreigners who desire to obtain a knowledge of local conditions here.

References to more extensive sources of information are given, but a good idea can only be formed by local investigation. In conclusion, therefore, we would refer to the list of officials and institutions which is published annually by the Board of Agriculture, and in which the names appear of all persons who are able and also willing to give further information.

In reviewing the condition of cattle-breeding in The Netherlands it may be remarked that here, as in almost every country of the world, there is no ground for speaking of excellent breeds all over the country. The great fame of our cattle has been established by a small number of pioneers, who have risen above the common level, and those who expect to find nothing but first-class breeders and first-class animals from one end of The Netherlands to the other will be bitterly disappointed.

At present there is a comparatively small group of leaders distributed unequally over the country from whom the progress proceeds These men are willing and eager to improve the breed, but they are also very eager to benefit thereby. Round this group there are a whole mass of men who might better be called cattle-keepers than cattle-breeders.

But cattle-breeding is advancing in the right direction. There are gratifying signs of this.

Cattle-farming flourishes. This demands attention and makes the cost of the various measures in the interest of the breeders less burdensome, a fact which is of great importance in a country where there are so many small holdings. The general development of the farmer classes increases daily, and the results of different steps taken by the Government are being felt more and more. In this way the circle of genuine breeders is gradually extending, and the number of those who do their best is constantly increasing. Thus the majority of the cattle-keepers are being gradually led in the right direction. The northern districts are not yet exporting their best breeding stock, but in many a market the blood of eminent breeding animals is already beginning to flow, and this will continue in proportion to the speed with which the excellent stock of the real breeding centres supplants the others.

DAIRYING IN THE NETHERLANDS.

The Netherlands dairy industry, which has been famous for centuries, has during the last 35 years undergone important technical changes, by which the manufacture of butter and cheese has been transferred, to a great extent, from the farm to the factory.

The chief dairy products of The Netherlands are butter (154 million lbs.), hard cheese (230 million lbs.) and condensed skim milk (66 million lbs.).

As regards the various kinds of cheese made in The Netherlands, we may say that:

Full cream Gouda cheese, with a yearly production of 88 million lbs., is almost exclusively made on the farms in the provinces of South Holland and Utrecht.

Fat Edam cheese, with a yearly production of 44 million lbs., is chiefly made in the province of North Holland, the production being about equally distributed over the factories and the farms.

Full cream and half cream Cheddar and Cheshire cheese is exclusively manufactured in dairies in the province of Friesland, the yearly production being 6 million lbs.

Leyden cheese — a product of skim milk — is exclusively manufactured on farms in the province of South Holland, the yearly production being 7.5 million lbs.

Frisian clove cheese — also a product of skim milk — is almost exclusively manufactured in dairies in the province of Friesland, the annual quantity amounting to 7.5 million lbs.

Cheeses of the Gouda and Edam shape, made from milk of which half or more of the fat has been skimmed off, are principally turned out by the dairies in the province of Friesland, the annual production being about 60 million lbs.

Of the butter made in The Netherlands about one-fourth is made on the farms, and the remainder in dairies.

Of the above-mentioned products a considerable quantity is exported to foreign countries; the Leyden and Frisian clove cheeses, however, are only made for home consumption. Almost three-fifths of the total butter output goes abroad, chiefly to Germany, France, England and Belgium, while the export to Austria is on the increase and the export of tinned butter for the tropics is becoming of greater importance.

More than one half of the total cheese production is exported, viz., to Germany, England, Belgium, France, etc.

Almost our total production of condensed milk finds its outlet in England and oversea countries.

In order to guarantee the purity of Netherlands butter, a Government mark has been introduced.

This Government mark is only placed on the butter made in dairies which are under the constant supervision of one of the seven Butter Control Stations. It not only guarantees purity, but also that the butter does not contain more than 16 per cent of water.

A Government mark has also been established for the full cream Gouda—Edam cheese, which guarantees that the cheese is made of whole milk, and contains at least 45 per cent. fat in the dry substance. This Government mark may only be used by makers who are under the continual supervision of the Cheese Control Stations at The Hague and Utrecht.

Further, the Friesland Cheese Control Station, at Leeuwarden, issues marks for makers who are under its supervision, for full cream Cheddar and Cheshire cheese, for half cream Cheddar and Cheshire cheese, and for cheeses in Gouda and Edam shapes, containing 45, 40, 30 or 20 per cent fat in the dry substance. The two large associations of co-operative and private dairies guarantee the efficiency of the supervision of the Cheese Control Station in Friesland.

In the factorial handling of dairy produce the co-operative system plays a highly important part. Out of the approximately 960 existing dairies, 686 are co-operative, while the rest are carried on by private owners or by limited companies. The dairies are driven either by steam or by hand-power. An average hand-power dairy produces about 33,000 lbs. of butter per annum (varying from 13,000 to 55,000 lbs.), and an average steam dairy about 175,000 lbs. per annum (varying from 55,000 to 650,000 lbs.).

The various systems in vogue when establishing factories for dairy products may be gathered from the following statement:

Co-operative steam dairies	421
Co operative hand-power dairies	265
Co-operative cheese factories	219
Private steam dairies	209
Private hand-power dairies	62
Private cheese factories	83

The organization of a co-operative dairy may be briefly described as follows. A number of dairy farmers within a certain district form themselves into a co-operative association, and establish a dairy for joint account. The members of the association bind themselves to deliver all the milk of their cows for handling at the dairy; they are further — either individually unlimited, or individually up to an amount mentioned in the Articles of Association — responsible for the debts and liabilities of the association. The proceeds of the sale of the produce, after deduction of the working expenses, are divided amongst the members, in proportion to the quantity of the raw material delivered by each member, whereby the fat content of the milk is frequently taken into consideration.

The members elect a Board of Directors from their midst, and an expert is appointed to act as manager.

The majority of the co-operative dairies have joined one of the seven associations of co-operative dairies, of which six again have formed a federation, i.e. the General Netherlands Dairy Association.

These associations of co-operative dairies, occupy themselves in the first place, individually, or jointly by means of their federation, with the improvement of the quality of the produce. For this purpose weekly butter competitions are held, and each of the associated co-operative dairies is bound to submit a certain quantity of their product for judgment

In corresponding manner cheese competitions are held in those provinces where they may be of importance. The great advantage of these competitions lies in the fact that the participating makers regularly obtain an impartial opinion on their produce, which is unbiassed by any influence of the market. In the second place improvement of the quality is striven after, by holding courses for the staff of the dairies, and by yearly examinations for the various situations in the dairies (assistant manager, butter-maker, cheese-maker, engineer and milk inspector). In the third place certain associations of co-operative dairies have appointed an expert to lend practical assistance in the event of defects in the manufacture.

On the cheese-market at Alkmaar.

Different requirements, such as coal, oil, packing-materials, milk-testers, etc., are purchased by the General Netherlands Dairy Association for the joint account of the federated associations. The said General Association employs a mechanical engineer to give advice in the purchase of machinery and the installation of dairies. For supervising the operations in the engine-room a teacher-engineer is employed, who gives advice to dairies when required.

With regard to the administrative control at the different dairies, most of the provincial dairy associations employ an official whose services again are at the disposal of the associated dairies when required.

Moreover, the General Netherlands Dairy Association, either alone, or in conjunction with other associations allied to the dairy industry, look after the general interests of the Netherlands dairy industry, both at home and abroad.

Of other associations we may here mention as being the most important, the Association of Dairy Owners in The Netherlands, whose members are private concerns; and the Netherlands Milk Hygienic Association, composed of milk purveyors only.

The system of co-operation is also followed in selling the products of the co-operative dairies. In the first place there exist in the province of Friesland two co-operative dairy export associations. Of these the Frisian Co-operative Dairy Export Association has thirty-three members and sells about $8^1/_2$ million lbs. of butter, and $3^3/_4$ million lbs. of cheese per annum. The Co-operative Dairy Export Association "de Swanneblom", consists of nine members and sells about 125,000 lbs. of cheese and 70,000 lbs. of butter per annum.

In the second place the South Netherlands Dairy Association, one of the members of the General Netherlands Dairy Association, exploits a Netherlands butter auction at Maastricht, solely for the public sale of butter with the Government mark. The annual sale amounts to almost 10 million lbs. of butter.

The General Netherlands Dairy Association hold a Netherlands butter auction at Arnhem similar to that at

Maastricht, the annual sale representing about 2 million lbs. of butter.

In addition thereto the said Association sells privately another $3^1/_2$ million lbs. of butter per annum, that is to say without the intermedium of the Netherlands butter auctions.

In order to support the butter and cheese makers with all possible advice in the exercising of their business, one or more dairy experts have been appointed in each province. Apart from giving advice and assistance when defects appear or when an establishment is to be equipped, the dairy experts give lectures and act as teachers at different courses. They have a laboratory at their disposal for conducting investigations relating to the dairy industry. Almost all the dairy experts are Government officials; in a few cases they are appointed by the Provincial Government or by a provincial agricultural association, who receive a Government subsidy for this purpose.

A Government dairy school exists at Bolsward for the scientific training of dairy managers.

There is a Government Dairy farm at Hoorn in connection with the Government Agricultural Testing Station, a private undertaking that is, however, liberally supported financially by the Government and by the Province of North Holland. The various experiments made in the interest of the dairy industry are chiefly under supervision of officials of the Government Agricultural Testing Station, in conjunction with the Government Dairy Expert for North Holland.

There is a Butter Act (last amended in the year 1905) for the prevention of the adulteration of butter. The enforcement of the provisions of this Act is in the hands of the Government Dairy Inspection which consists of an inspector, sub-inspector and a number of dairy officials. These officials also exercise constant control over the Butter Control Stations and the Cheese Control Stations at The Hague and Utrecht. The analysis of the butter and cheese samples, necessary for the observance of the Butter Act, and for the supervision of the Butter and Cheese Control Stations, takes place at the Government Dairy Station at Leyden.

STATE MEASURES ON BEHALF OF AGRICULTURE [1].

One of the subdivisions of the Ministry of Agriculture, Industry and Trade is the Direction or Board of Agriculture, which body, under the control of the Director General of Agriculture, is entrusted with the care of all agricultural interests. The Direction is divided into a number of departments, at the head of several of which departments inspectors are placed.

The measures which are taken by the State on behalf of agriculture may be divided into four chief groups, i. e.

1. measures which concern agriculture in general;
2. those relating chiefly to arable, horticultural and arboricultural lands;
3. those relating chiefly to stock-breeding; and
4. those relating to the dairy industry.

1. MEASURES CONCERNING AGRICULTURE IN GENERAL.

The agricultural education in the Netherlands (including horticulture and arboriculture) comprises university, secondary and elementary education. While it is true that the institutions of the first-named branch are subject to the same laws which govern the schools for secondary education, in every other respect they have the character of a university: consequently the education received there should be considered as such.

I. University agricultural education is given at:

The State University College of Agriculture, Horticulture and Forestry at Wageningen.

II. Secondary agricultural education is given at:

1. *a.* The Secondary Agricultural School at Groningen;
   b. the Secondary Colonial Agricultural School at Deventer;

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[1] The following matter is an abridged translation in English of a brochure issued by the Board of Agriculture.

Head Office of the Direction or Board of Agriculture at The Hague.

2. The State Dairy School at Bolsward;
3. The State Agricultural and Horticultural Winter Schools;
4. The Gerard Adriaan van Swieten Horticultural School at Frederiksoord; and
5. The Forestry Course of the Netherlands Heath Association at Arnhem.

III. Elementary agricultural education is given at:
1. Agricultural and Horticultural Winter Courses;
2. Courses for Adults;
3. Courses for Conscripts; and
4. Divers Courses.

IV. The educational staff for agricultural, horticultural and arboricultural education receive their training at the State University College of Agriculture, Horticulture and Forestry at Wageningen, and at training courses for agricultural and horticultural teachers.

V. Industrial education for the female rural population is at present given:
1. at schools subsidized by the State;
2. at summer courses connected with the State agricultural and horticultural winter schools;
3. at courses for farmers' daughters;
4 at short courses for workmen's wives and young women; and
5. at divers courses, such as those for the handling of dairy produce, cattle feeding, etc.

In addition to the supervision commissions, the supervision of the secondary and elementary agricultural education is entrusted to the Inspector of Agricultural Education; and the elementary education and the industrial education of the female population of the rural districts is supervised in conjunction with the State agricultural and horticultural experts.

State University College of Agriculture, Horticulture and Forestry at Wageningen.

I. THE STATE UNIVERSITY COLLEGE OF AGRICULTURE, HORTICULTURE AND FORESTRY AT WAGENINGEN, AND THE INSTITUTIONS CONNECTED THEREWITH.

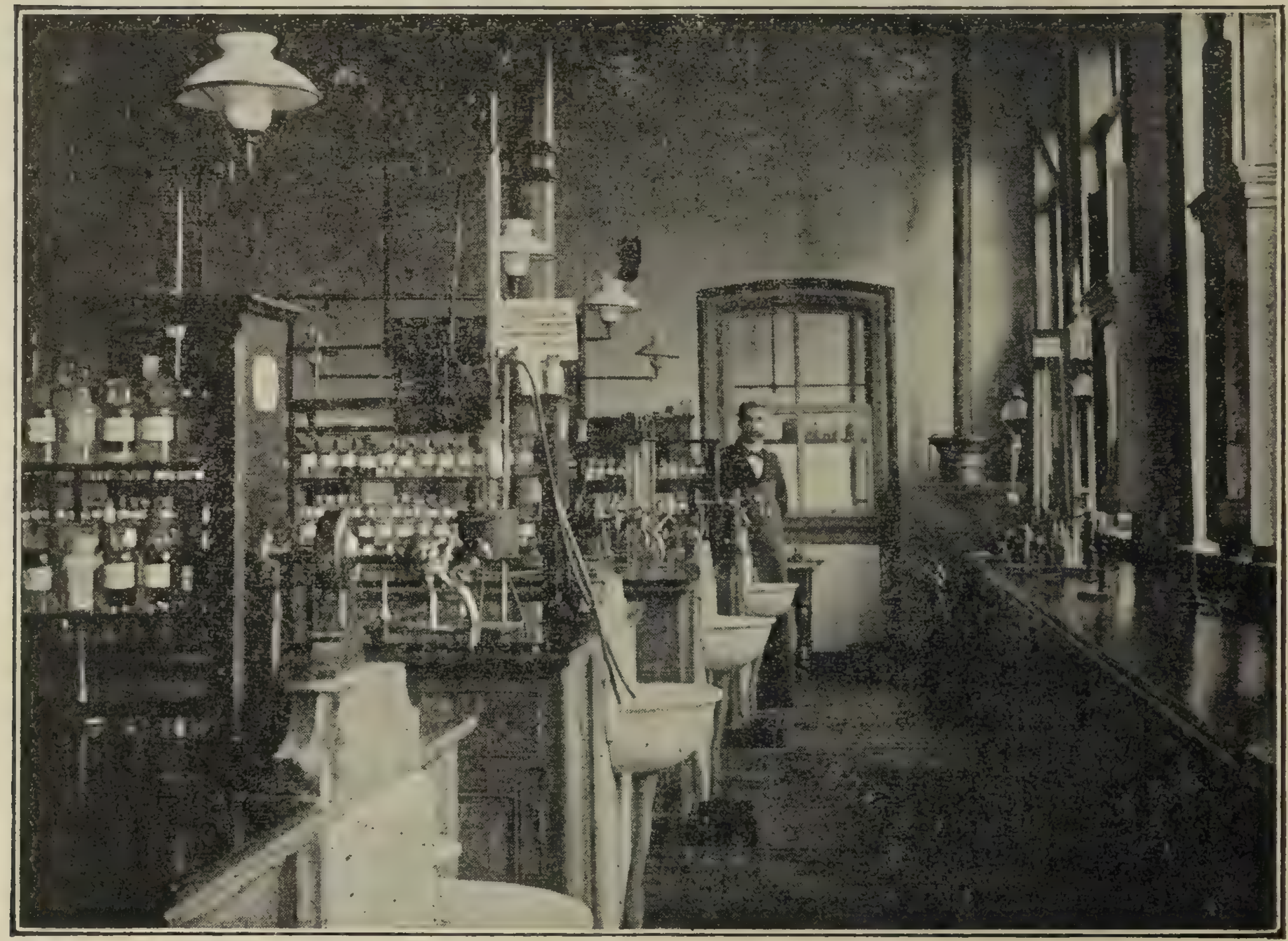
This College is intended for the scientific training of sons of big landowners, the better-off farmers, and big nurserymen, and above all the formation of future officers of the State, companies, and associations of private persons. It must see to the formation and training of future State agricultural and horticultural experts; of teachers at the agricultural and horticultural schools; of dairy experts; of assistants, both analytical and agricultural, at experimental stations; of forestry officers both in this country and the colonies; the officers of the Netherlands Heath Association; and of officers of plantations and agricultural industries both in this country and the colonies. Lastly, the College undertakes scientific research into all matters pertaining to agriculture, horticulture and arboriculture.

The education comprises the different branches of husbandry and agricultural technology, and is divided into the following sections of study:

1. Netherlands agriculture;
2. Colonial agriculture;
3. Netherlands forestry;
4. Colonial forestry;
5. Agricultural chemistry and agricultural technology, and
6. Horticulture.

Further, the education is so regulated that each section of study covers a course of three years in all. Those who wish to continue their studies beyond that period may avail themselves of the fourth year of study the College sets at their disposal. There are also special courses held.

The students, in addition to the theoretical instruction, are given every possible opportunity of undertaking practical exercises. Different laboratories, such as for chemistry, botany, anatomy and physiology, mineralogy and geology, science of agriculture and bacteriology; and collections pertaining to natural history and phytopathology, anatomy and physiology, diseases and therapeutics of domestic animals, physical and meteorological instruments, minerals, stones and kinds of soil, ethnographical objects, race models, models in papier maché and illustrations relating to instruction in live stock, forestry, agricultural machinery and implements, surveying, etc., are at the disposal of the students. Hence the education is not only of a high standard, but is thoroughly practical as well.



The large Chemistry Laboratory.

The experimental fields, the grounds for phytopathology, orchard culture, kitchen gardens and horticulture with the accessory greenhouses, the conservatories for tropical plants, the botanical garden, the "Het Spijk" Species Gar-

The Duivendaal Farm.

den, the "Duivendaal" Farm, together with the considerably larger "Groenendaal" Farm, which latter is taken on lease from the Municipality of Wageningen, are important factors in preserving a high standard of education; while the library, which contains about 12,000 works on the science of agriculture and its side branches, as also the carefully selected supply of trade papers on the reading table, are a rich source of study in themselves.

The following institutions, arranged in the sequence of their establishment, are connected with the College:

1. *The Sugar Laboratory.*

This is intended for the use of those who desire to specialize in the chemistry and technology of sugar manufacture, with a view to future employment as analytical chemists in sugar factories.

2. *The Agricultural Implements and Buildings Institute.*

This institution devotes itself to:

a. the guidance of farmers in the purchasing and use of machinery and implements;
b. ascertainment of the technique of agricultural appliances; and
c. the extension of advice to farmers and agricultural associations on the erection and alteration of buildings in connection with the agricultural industry.

3. *The Phytopathological Institute.*

This institution is under the management of the teacher of phytopathology, who officiates as Director of the Institute.

The Institute undertakes the supplying of information on plant diseases and scathes, and the means of preventing and fighting same.

It is further engaged in researches with a view to increasing the knowledge of phytopathology, and the prevention and eradication of plant diseases and scathes. Finally, it

The Phytopathological Institute

renders educational assistance to the State University College of Agriculture, Horticulture and Forestry.

4. *The Institute for Improvement of Agricultural Crops.*

This Institute was established for the purpose of furthering the improvement of agricultural crops, both by breeding new valuable species and striving to keep in existence the acknowledged choice species, as also by supporting the attempts of others in this direction; engaging in scientific researches for the improvement of plants, and extending information to farmers and persons who take up the improvement of plants.

In common with the other institutes, it also renders educational services on behalf of the State University College of Agriculture, Horticulture and Forestry.

II. THE SECONDARY AGRICULTURAL, HORTICULTURAL AND ARBORICULTURAL EDUCATIONAL INSTITUTIONS.

The Secondary Agricultural School at Groningen.

Art. 2 of the Regulations of this School reads:

"The Secondary Agricultural School consists of a course extending over two and a half years, and is intended for those who, after previously having received a few years' preparatory university, secondary or extended elementary education, wish to prepare themselves for the practise of agriculture.

As an educational institution it lies midway between the State University College of Agriculture, Horticulture and Forestry, and the State agricultural winter schools. For the sons of our big farmers, the study at the University College does not commend itself, as it would keep them away too long from practical spheres, with the chance even that it would result in alienation altogether; on the other hand the education given at the State agricultural winter schools is of too one-sided a character, as they could never, with training of that kind, expand into the leaders of agriculture which they are destined to be and which entails the performance

The Secondary Agricultural School and State Agricultural Winter School at Groningen.

of many duties lying outside the province of their profession; for these youths therefore the secondary agricultural school is the training institute *par excellence.*

Candidates for admission to the school must first pass an examination which is about on a par with the final examination of a three-year secondary school, or the test examination for passing from the third to the fourth class of a five-year secondary school. Candidates, in order to be admitted to the examination, must have attained the age of fifteen years on January 1 of the first year.

The course comprises three winter and two summer terms, so that the third class ends in the spring and not in the summer.

The Secondary Colonial Agricultural School.

Art. 2 of the Regulations of this School reads:

"The Secondary Colonial Agricultural School covers a course of three years' duration, and is intended for those who, after having been previously prepared for a few years at a preparatory, secondary or extended elementary school, desire to be trained for the practise of agriculture in the Tropics, particularly in the State Colonies and Possessions".

The education is arranged in accordance with the requirements of tropical agriculture, while the general and the professional education of the pupil are also kept in view.

Practical exercises in growing, pruning, grafting, etc. in the nurseries and greenhouses of the school; in surveying, manipulation of wood and metals, and in the laboratories for chemistry, physics, and natural history are important factors in supporting the theoretical education programme.

The school does not aim at the training for one particular culture, but for the practise of tropical agriculture in general. Those who obtain the final diploma, will need extra study to take up special cultures, however they have already been grounded to that end.

The terms for admission correspond to those fixed by the Secondary Agricultural School.

The Secondary Colonial Agricultural School at Deventer.

The State Dairy School at Bolsward.

The object of this institution is the training of the expert dairyman, qualified to act in due course as director of a dairy factory.

Those seeking admission to the school, must have attained the age of eighteen years, and submit a testimonial testifying to at least a year and a half's experience at an institution for the factorial preparation of butter and cheese, or in a dairy and an establishment for cheese-making. Further, they must pass a public admission examination, comprising the subjects of reading and Netherlands grammar, arithmetic, algebra, geometry, geography and physics.

The State Agricultural and Horticultural Winter Schools.

There are nine State agricultural winter schools established in our country, and that in the following places: Groningen, Veendam, Leeuwarden, Meppel, Zutphen, Schagen, Dordrecht, Goes and Sittard. The State horticultural winter schools number five in all, and are established respectively at Aalsmeer, Lisse, Naaldwyk, Boskoop and Tiel.

The winter schools are established with a view to furnishing, at moderate costs, the future farmers and market gardeners with the necessary theoretical knowledge they need of the agricultural or horticultural industry.

The schools have two classes. The course runs over two winter half years, with intermediate vacations each time from 24th December to 3rd January.

Those desiring to attend the winter schools, must have attained the age of sixteen years and pass a public examination which, as a rule, comprises the following subjects: reading, Netherlands grammar, writing and arithmetic, and give testimony that they possess the qualifications for attending the school to advantage. At the same time a certain amount of practical knowledge of farming or gardening is demanded, while of those who desire to attend the German and English commercial correspondence classes of the schools

The State University College of Agriculture etc., at Wageningen.

at Boskoop, Aalsmeer and Lisse, the rudiments of those languages are required as well.

The instruction is of a theoretical nature, and takes due account of the needs of the agricultural or horticultural industry of the province or district in which the school is situated.

The Gerard Adriaan van Swieten Horticultural School at Frederiksoord.

This school aims at the training of able gardeners by acquainting them with the growing of vegetables, fruit and decorative plants, both in the open air and in greenhouses, as also with the sciences of mathematics and physics, for as much as they relate to gardening.

The Forestry Course of the Netherlands Heath Association at Arnhem.

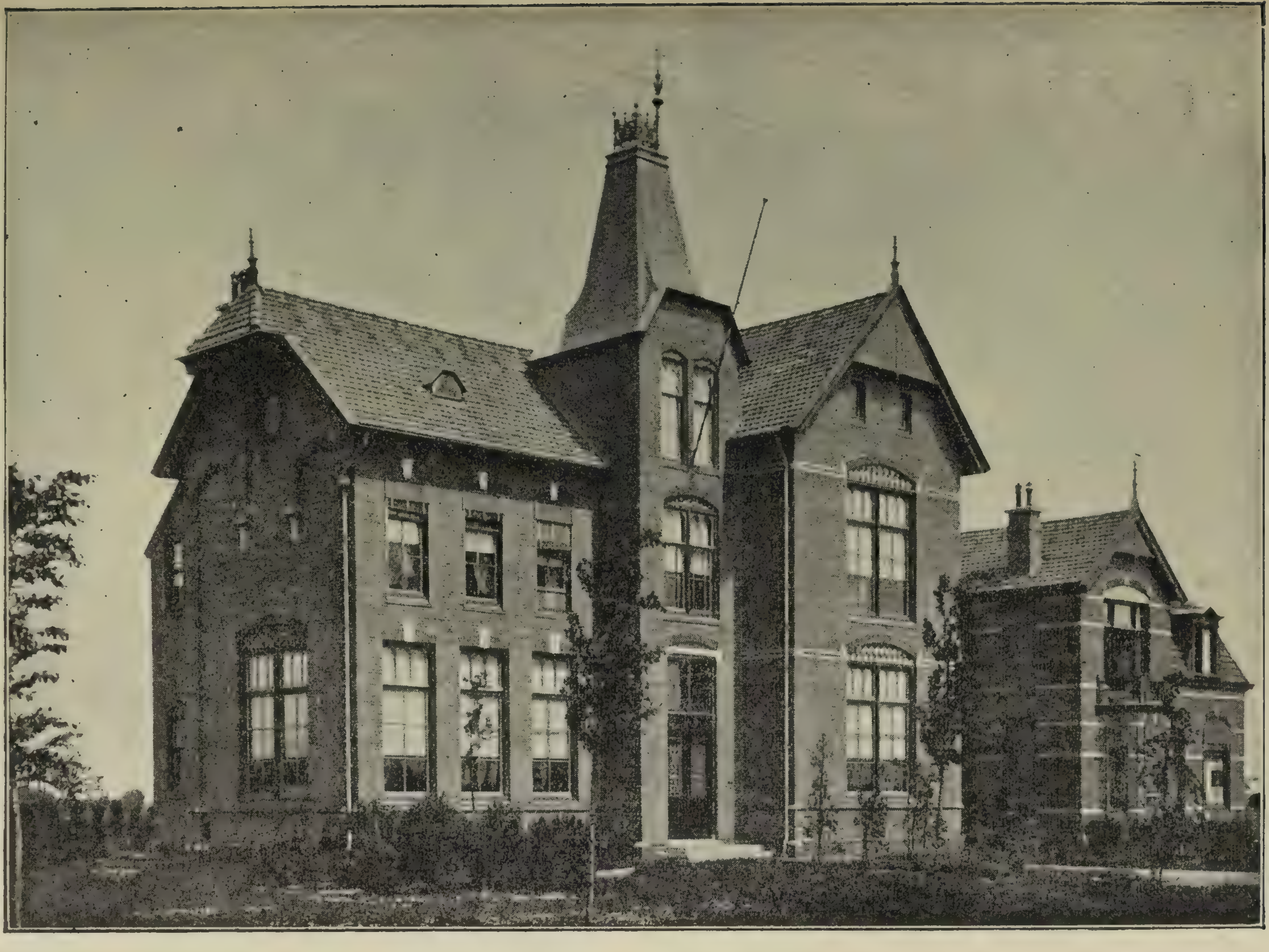
This Course includes the training of forest officers and stewards, foresters and keepers, both for the service of the Netherlands Heath Association, the State Management of Forests, and private owners. The theoretical instruction, which extends over two winter half years, from 1st October to 1st March, is conducted by the staff of the Netherlands Heath Association and the State Management of Forests. The practical training of the pupils is conducted at the works managed by the said corporations, during the remaining months of the two training years.

III. ELEMENTARY AGRICULTURAL AND HORTICULTURAL EDUCATION.

Agricultural and Horticultural Winter Courses.

These courses are institutions for the instruction in agriculture and horticulture, emanating from agricultural or horticultural associations and municipalities, which receive a State subsidy.

In the winter of 1912/1913 there were 406 agricultural winter courses held, and 120 horticultural winter courses.



The State Dairy School at Bolsward.

The instruction at agricultural winter courses is entrusted to teachers certificated for the elementary teaching of the science of agriculture, they being occasionally supported by veterinary surgeons and ordinary teachers.

It includes:

1. the elements of natural science and chemistry, botany and zoology, the latter including animal pests and plant diseases;
2. the knowledge of the soil, tilling and improvement of the soil;
3. common and special plant culture;
4. the common and special stock-breeding and dairying; and
5. manuring methods.

The instruction at horticultural winter courses is imparted by teachers certificated for the elementary teaching of horticultural science, they being supported or not, as the case may be, by practitioners. This instruction may also be given by teachers holding a certificate for the elementary teaching of agricultural science, provided they are assisted by practitioners.

It includes:

1. the elements of physics and chemistry, botany and zoology, including animal pests and plant diseases;
2. knowledge of the soil, tilling and improvement of the soil;
3. the knowledge of fruit culture, vegetable culture, floriculture, and arboriculture; and
4. manuring methods.

In both groups of institutions the education is regulated in accordance with the needs of the districts in which they are situated The courses extend over at least two winter half years, during which period from 144—225 hours of instruction are given. A few lessons may also be given during the summer months The instruction is either free of charge, or on payment of a moderate school fee, and usually takes place two evenings a week.

The State Agricultural Winter School at Groningen.

For admission to the course the pupil must have attained the age of fifteen years, and give evidence of having made due progress at an elementary school, and preferably at a continuation school as well.

Once a year the Government officer charged with the supervision of the courses in his district has a meeting with the principals of the institutions in question, for discussion of the interests of the education entrusted to their hands. The above-mentioned Government officers confer once or twice a year with the Inspector of Agricultural Education.

The teachers are appointed by the committees of the subsidized corporations, in conjunction with the relative State agricultural and horticultural experts, the appointment being subject to the approval of the Minister. Suspension and dismissal of the teachers are likewise in the hands of the said committees, in conjunction with the officers mentioned.

The subsidizing of agricultural and horticultural winter courses by the State is regulated by Royal Decree.

All the provincial commissions, except that of Overyssel, grant subsidies for agricultural and horticultural winter courses. These are, as a rule, maintained independent of any Government subsidy, and principally serve for the salary increase of the teachers.

At the close of the course a public lesson is held in the presence of the Commission of Supervision, and the Government officer charged with the supervision of the course. A certificate is awarded to those who give evidence of their having attended the course with profit.

The following table shows the distribution of the agricultural and horticultural winter courses during 1912/1913 over the different provinces, the contributions made on the part of the State, and the number of pupils attending the classes:

The State Horticultural Winter School at Boskoop.

Provinces.	Agricultural Winter Courses.			Horticultural Winter Courses.		
	Number.	Number pupils at commencement.	Amount State Subsidies	Number.	Number pupils at commencement.	Amount State Subsidies.
			Guilders.			Guilders.
Groningen . . .	30	378	7,476.72[5]	6	130	1,999.99 [5]
Friesland	36	455	9,270.06	3	42	701.05 [5]
Drenthe	17	291	4,130.70	2	34	549.10 [5]
Overyssel. . . .	43	576	10,940.04[5]	3	55	721.50
Gelderland . . .	68	1,115	17,346.42	19	305	5,435.52
Utrecht.	17	289	4,131.85[5]	7	128	2,008.23 [5]
North Holland .	34	489	8,903.32	27	521	8,293.72
South Holland .	30	496	7,569.54	22	481	6,363.00 [5]
Zeeland.	28	272	7,970.46	6	68	1,764.10
North Brabant.	78	1,717	18,611.04[5]	15	251	4,523.54 [5]
Limburg	25	510	6,667.32[5]	10	272	3,113.00
Total . . .	406	6,588	103,017.50	120	2,287	35,472.78

Agricultural and Gardening Courses for Adults.

These courses are partly intended to convey, in from six to twelve lessons, the principal factors pertaining to one or the other branch of farming or horticulture, to adults engaged in agriculture or horticulture. They are also open to those who have attended an agricultural or horticultural winter course with profit.

They are also partly intended to give youths who are engaged in agricultural or horticultural industries, and who, as a rule, have already attended some agricultural or horticultural institution, a somewhat wider insight into a special branch of their industry.

Although a few courses of the kind were held in 1903, the more systematic granting of subsidies to these institutions on the part of the State, dates from the year

1904, and the regulations therefor were fixed by Royal Decree.

The following table gives a review of the number of these courses which were held in the winter half-year 1912/1913, showing also the number of persons who attended the courses, and the amounts granted by the Government:

Provinces.	Agricultural Winter Courses			Horticultural Winter Courses		
	Number.	Number pupils.	Amount State Subsidies	Number	Number pupils.	Amount State Subsidies
			Guilders			Guilders
Groningen . . .	7	145	352.20	1	30	129.25
Friesland	5	99	206.—	1	18	60.—
Drenthe	3	76	209.50	—	—	—
Overyssel . . .	14	284	842.91^5	3	50	282.10
Gelderland . . .	30	838	1,930.26	18	435	1,592.45
Utrecht	5	84	291.95	10	233	828.49
North Holland .	6	119	404.60	15	334	1,838.77^5
South Holland .	7	112	417.80	8	164	808.20
Zeeland	8	143	524.35	5	75	313.80
North Brabant .	28	1,012	1,745.52^5	8	188	751.80
Limburg	17	575	1,034.45	9	220	644.47
Total . . .	130	3,487	7,959.55	78	1,747	7,249.33^5

Courses for Conscripts in Actual Service

This instruction is given once or twice a week during the months of December, January and February, and each time for two consecutive hours, 20 hours' instruction being given in all. Participation in the classes is voluntary, but such conscripts as have applied for admission are expected to make regular attendance. The number of participants,

Pupils of the G. A. van Swieten Horticultural School at work.

who must belong to the agricultural class and be sufficiently intelligent, must not be less than twelve.

Divers Courses.

a. Courses for horse-breeding and cattle-breeding.

These courses are chiefly intended to give such farmers as have not attended any agricultural school, an opportunity of increasing their knowledge of horses and cattle.

In general a course consists of 12 lessons of two hours, seven or eight of which are destined for theoretical instruction and the remainder for practical application.

b. Courses for horse-shoeing.

The opportunity for receiving a more or less extensive training is thrown open to farriers in the Netherlands at the Riding and Farriers' School at Amersfoort, the State Veterinary Surgeon College at Utrecht, the State-subsidized School of the Gelderland-Overyssel Society of Agriculture at Tiel, a private establishment for the training of smiths at Groningen, and at the Courses for horse-shoeing subsidized by the State or Provincial Commissions.

The superintendence of the courses is entrusted to certificated surgeons, to whom indeed the theoretical instruction is entrusted.

Instruction in practical shoeing is given by certificated farriers, the majority of whom have received their training at a military course for farriers, or at the Training Course for Practical Teachers of Farriery at the State Veterinary Surgeon College.

For admission to a course the candidates must be at least twenty years of age and properly developped physically, able to read and write properly, and give evidence to the satisfaction of those who are charged with the instruction of a certain amount of ability in practical horse-shoeing.

As a rule only eight pupils are admitted to the practical classes. Should there be over that number, the class is then divided into parties of eight.

View in the grounds of the G. A. van Swieten Horticultural School.

c. Various Lectures and Courses.

To the elementary education we may finally also assign in a large measure the lectures and courses held by the State agricultural and State horticultural experts, the dairy experts, and the professors and teachers appointed therefor by different companies and associations with the support of the Government.

IV. TRAINING OF THE EDUCATIONAL STAFF PERTAINING TO AGRICULTURE, HORTICULTURE AND ARBORICULTURE.

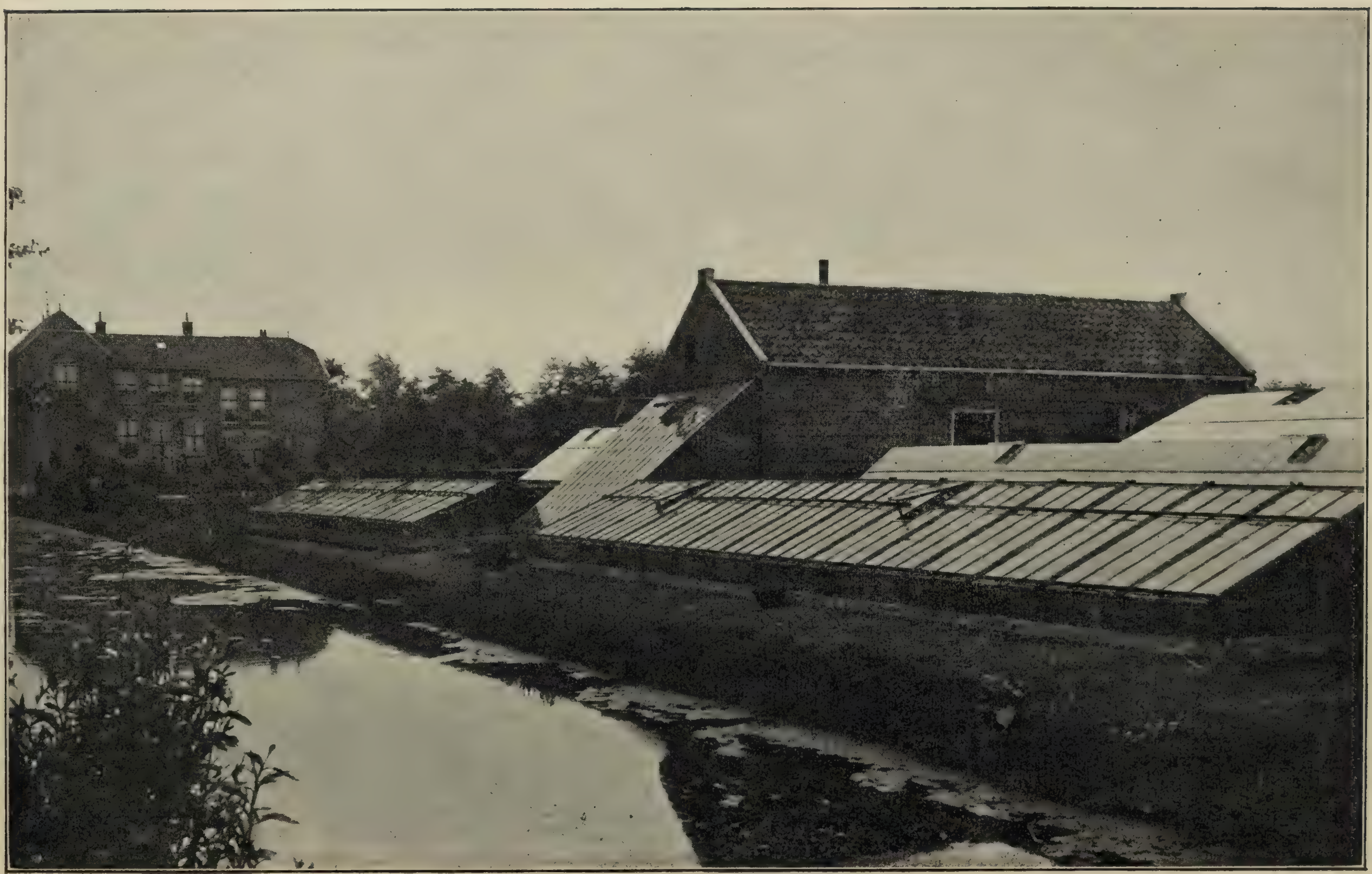
Although the agricultural, horticultural and arboricultural education is entrusted to practitioners, veterinary surgeons, teachers and professors holding elementary, usual secondary and gymnasial certificates, the bulk of the teachers nevertheless consists of holders of certificates for the elementary teaching of agricultural and horticultural science, and certificates for the secondary education of the science of agriculture, horticulture and arboriculture.

For teachers desirous to obtain a certificate of competency for imparting elementary education of the agricultural and horticultural sciences, there are separate courses instituted by the State, which are under the superintendence of the State agricultural and horticultural experts; they are supported in this instruction by the teachers of secondary and gymnasial education at the winter schools, dairy experts, veterinary surgeons, and occasionally also by head masters holding an agricultural or horticultural certificate.

The education is as a rule extended over a period of three years, either throughout the year, or during the summer months only.

For the sake of variety the courses are held at different places so as to suit the convenience of teachers in the several parts of the country.

Subsidies are occasionally granted by the Government to agricultural and horticultural teachers who desire to qualify themselves further by attending special courses or travelling for study purposes. The number so subsidized is fixed each year by the Minister.



Greenhouses in the garden of the State Horticultural Winter School at Boskoop.

V. INDUSTRIAL EDUCATION OF THE FEMALE POPULATION OF THE RURAL DISTRICTS.

The closing years of the last century saw a system of education spring up in the neighboring States of Europe for extending the knowledge of future wives of farmers (and farm labourers) so as to enable them to fill their future place as housewife, mother and farmer's wife, in accordance with the exigencies of the district and class, in the most successful way.

It is only of late years, however, that the necessity for such industrial education has made itself felt in this country.

At present there are courses in agricultural education and agricultural economy open all over the country to the female population of our rural districts.

The teaching staff for these courses receive their training at an institution established at the Dedemsvaart in Overyssel, which is entitled the State Agricultural School of Domestic Economy.

The education of Veterinary Surgeons takes place solely at the State Veterinary Surgeon College at Utrecht. It is at this institution that the veterinary surgeons have been trained who exercise the profession both in The Netherlands and the Colonies.

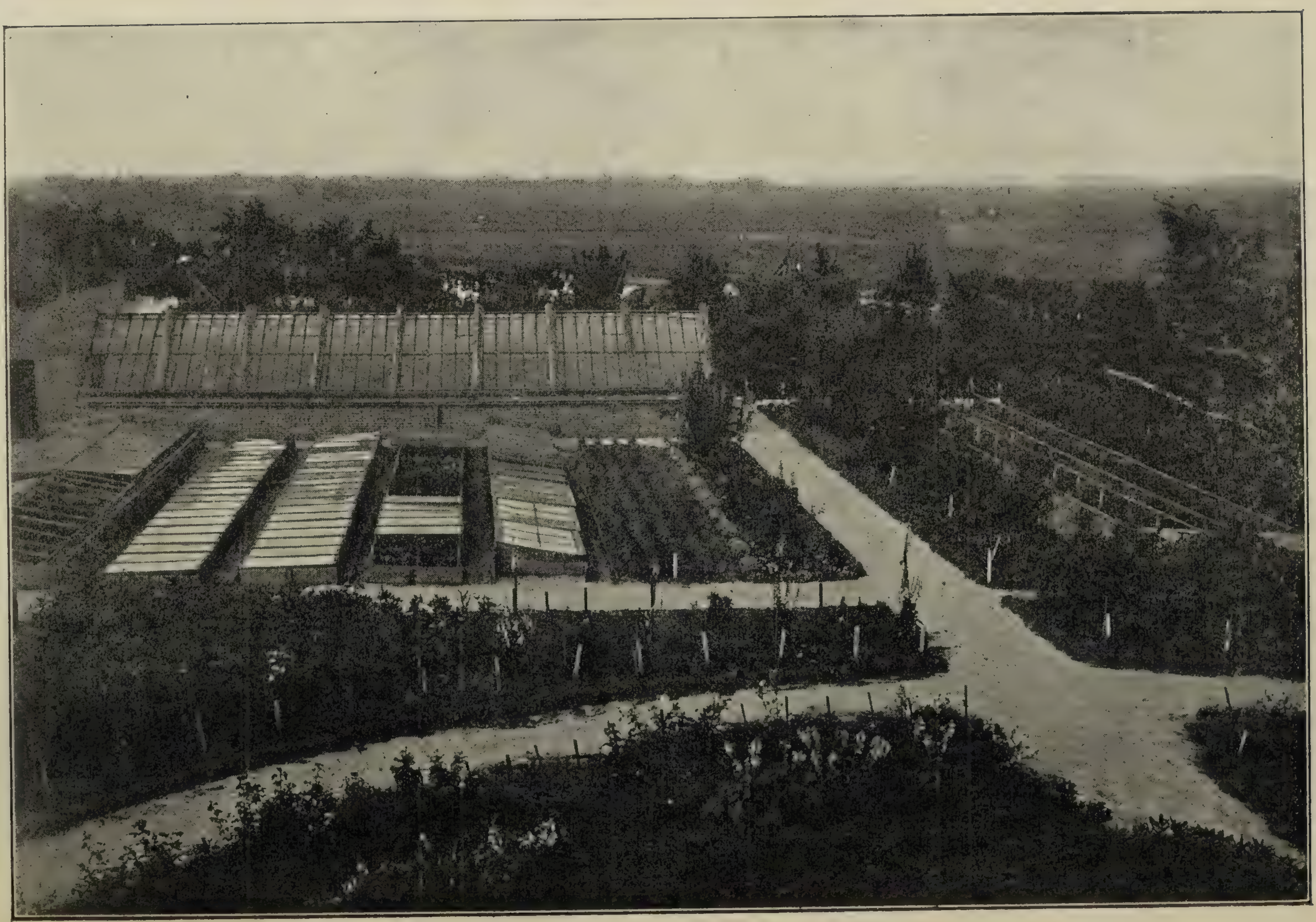
Would-be students must first pass a preliminary examination, unless they are in the possession of the final diploma of a secondary school (five years' course) or that of a gymnasium.

The education is both theoretical and practical, and comprises a preliminary (propædeutic) and applied veterinary surgical section.

The propædeutic section includes physics and chemistry, botany and zoology, mineralogy, and geology, with practical exercises in chemistry and botany.

The veterinary surgical section includes the following subjects :

1. Anatomy,
2. Edible, medicinal and poisonous plants,

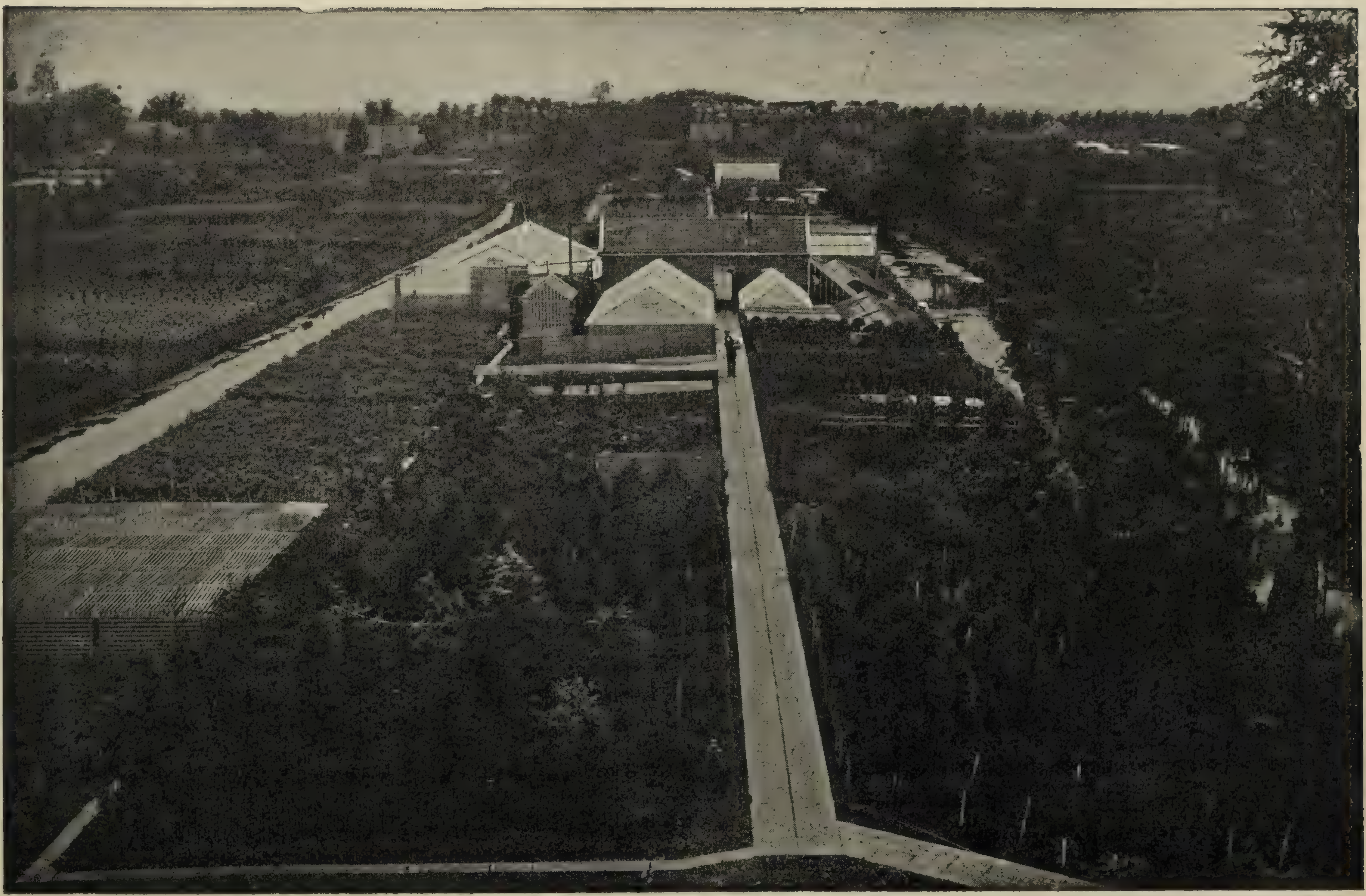


The State Horticultural Winter School at Aalsmeer: View of the garden.

3. Medicinal wares,
4. Preparation of medecines,
5. Natural history, exterior and racial knowledge of domestic animals,
6. Histology, physiology and embryology,
7. Hygiene,
8. Farriery,
9. Live stock breeding,
10. Parasitical and contagious diseases,
11. Surgical anatomy,
12. General pathology,
13. Obstetrics,
14. General medical aid,
15. Study of hoof disease,
16. Pathological anatomy,
17. Study of throat and ear,
18. Operating and bandaging,
19. Medecines and poisons,
20. Special pathology and medecine,
21. Veterinary Surgical Police,
22. Judicial veterinary knowledge,
23. History and literature of veterinary surgeon practice,
24. Meat testing, and
25. Agriculture (as extra subject).

Practical education is given in:

1. Anatomy,
2. Horse-shoeing,
3. Medecine,
4. Botany,
5. Chemistry,
6. Normal structure,
7. Chemical diagnosis,
8. Pathological structure,
9. Propædeutic clinique,
10. Operating and bandaging,
11. Clinique (consultative, stationary, ambulatory),
12. Applied exterior knowledge,
13. Obstetrics,



The State Horticultural Winter School at Boskoop: View of the gardens.

14. Food science,
15. Bacteriology,
16. Meat testing, and
17. Parasitical and contagious diseases.

The entire education is spread over five years.

The following is a list of the principal institutions and collections for the aid of the students:

1. Physical Cabinet,
2. Chemical laboratories,
3. Natural history museum,
4. Horticultural garden,
5. Collections of food specimens, medicines, objects for operating purposes and bandaging, shoeing and obstetrics,
6. Museums relating to normal anatomy of domestic animals, pathological anatomy (latter consists of two divisions, i.e. nosology and teratology), parasitical and contagious diseases,
7. Dissection theatre and three clinical wards, one for horses, one for cattle and internal diseases, and one for small domestic animals,
8. Laboratories for study of structure and physiology, pathological anatomy, parasitical and contagious diseases, chemical analysis and clinique,
9. Section building, with demonstration hall,
10. Riding-school, six horse stables with sixty stalls, sixteen one-horse stables, two separate cattle stables, two stables for about thirty-four cattle (breeding included), a pig-sty and three dog stables,
11. Apothecary,
12. Shoe smithy,
13. An ambulatory or outside clinique in the city of Utrecht and environs for cattle, as also for such horses, sheep and pigs as it would be difficult to convey to the veterinary school or detrimental because of the nature of their disease. (This department has its own horse and conveyance).

The State Horticultural Winter School at Tiel: View of the fruit garden.

Further, the College possesses a library containing about 6,000 works (about 15,500 volumes) and other literary matter, besides two reading rooms.

The Board of Agriculture annually distributes a number of works on agriculture Of these we will first mention the "Verslagen en Mededeelingen van de Directie van den Landbouw", five to seven of which are usually issued in the course of the year. One of these publications will annually contain the "Report on Agriculture in the Netherlands". This Report gives a statistical review of the condition of agriculture during the preceding year.

Another issue which annually appears as one of the Reports is an up-to-date "List of Official Persons, Institutions and Associations in connection with Agriculture and Horticulture".

Further, there has hitherto appeared in the Reports and Communications, either annually or with intervals of a few years, Reports on agricultural education, State agricultural experimental stations, and State measures for promotion of stock breeding, as also concise reviews regarding the results of the State subsidized experiment fields. Presumably a few of these reports will cease, in view of the concise report emanating from the Board of Agriculture which is to be issued annually on all branches connected therewith.

Finally, the Reports and Communications include numerous treatises on various agricultural subjects.

A free copy of these Reports and Communications is sent to all the agricultural and horticultural associations. The remaining copies are obtainable at a moderate charge.

In addition to the Reports and Communications, popular pamphlets are issued on subjects of interest for practical farmers. These pamphlets are obtainable free of charge by the agricultural and horticultural associations for distribution amongst their members.

In the event of a publication not being suitable for comprisal in the Reports and Communications, or in the free publications, it is issued separately.

The State Horticultural School at Tiel: View of the fruit garden.

Besides the subsidies to agricultural associations for special purposes, the State also supports associations which aim at the promotion of agriculture in general.

2. MEASURES RELATING CHIEFLY TO ARABLE, HORTICULTURAL AND ARBORICULTURAL LANDS.

The State agricultural and horticultural experts are usually chosen out of those who have passed the examination for agricultural or horticultural secondary teachers. They begin their career as aspirant State agricultural or State horticultural expert, by acting as assistants to one of the State agricultural or State horticultural experts; they are further given special commissions either at home or abroad. They are also engaged at the winter schools, under the superintendence of the directors. If after expiry of their probationary period, which usually extends over two years, they seem fitted for the post of State agricultural or State horticultural expert, they come under consideration for a fixed appointment as such.

After their definite appointment, some of them are first taken into the general service, and they are given temporary posts either at home or abroad. Their obtainment of fixed posts depends upon the needs of the moment.

The Director General of Agriculture allots to each State agricultural and State horticultural expert their particular station and district. Removal, however, may take place at any time if necessary. A number of these officers have no fixed district of office but remain in the general service.

The spheres of the State agricultural and State horticultural experts have gradually widened, both as regards the actual agriculture and horticulture education. In consequence of this they exercise their profession under the supervision of the Inspector of Agriculture.

In accordance with instructions determined by Ministerial Order of 11th November, 1911, they are in the first place charged with the superintendence of the experiment field and nurseries, which are conducted in accordance with their plans, and upon which they issue a yearly report.

A part of the State Agricultural Experimental Station at Groningen, with Vegetation Establishment.]

They hold lectures on subjects relating to agriculture or horticulture. These lectures are free to the general public, and finish up with a debate.

They furnish the Chief of the Phytopathological Service with information gathered in their official district, concerning diseases of crops and animal pests.

They lend assistance towards the collection and control of data for the harvest reviews and agricultural report.

Further, they are under the obligation to give advice, upon request, to the Minister, the Commissaries of the Queen, and the Burgomasters of the municipalities situated within their district of office; as well as to give information to farmers or horticulturists (which they do free of charge) who are situated in their district, upon all matters relating to the agricultural or horticultural industry. They submit an annual analytical report on their duties to the Director General.

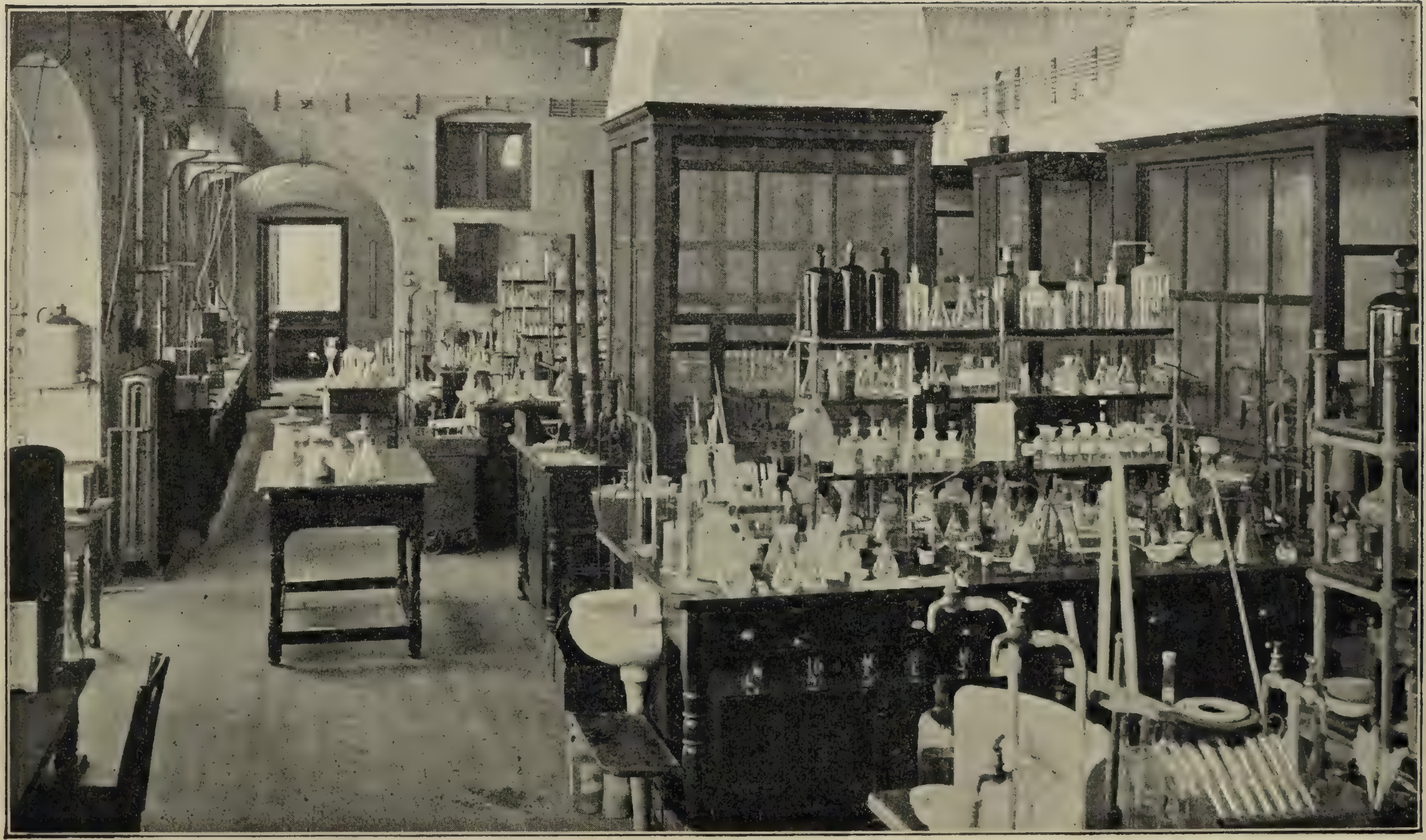
The nature of their officership entails their keeping themselves duly informed of the association life within their radius, remaining in touch with the boards of the associations and attending their meetings.

In respect to their efforts on behalf of agricultural and horticultural education, we may say that eight State agricultural experts and that five State horticultural experts are charged with the direction of a winter school. In this capacity they may be relieved from the winter duties of the State agricultural and State horticultural teachers, notably the holding of lectures.

All are charged with the management of the courses for the training of agricultural and horticultural teachers; and further with the supervision of the agricultural and horticultural winter courses, the courses for adults and conscripts, as well as the courses for study of horses and cattle and those held on behalf of the women and girls of the farming class.

Twice a year they attend a meeting held in the offices of the Board of Agriculture under the chairmanship of the Inspector of Agriculture, for discussion of questions which arise in connection with the correct fulfilment of their duties.

With a view to the verbal advice given, most of the



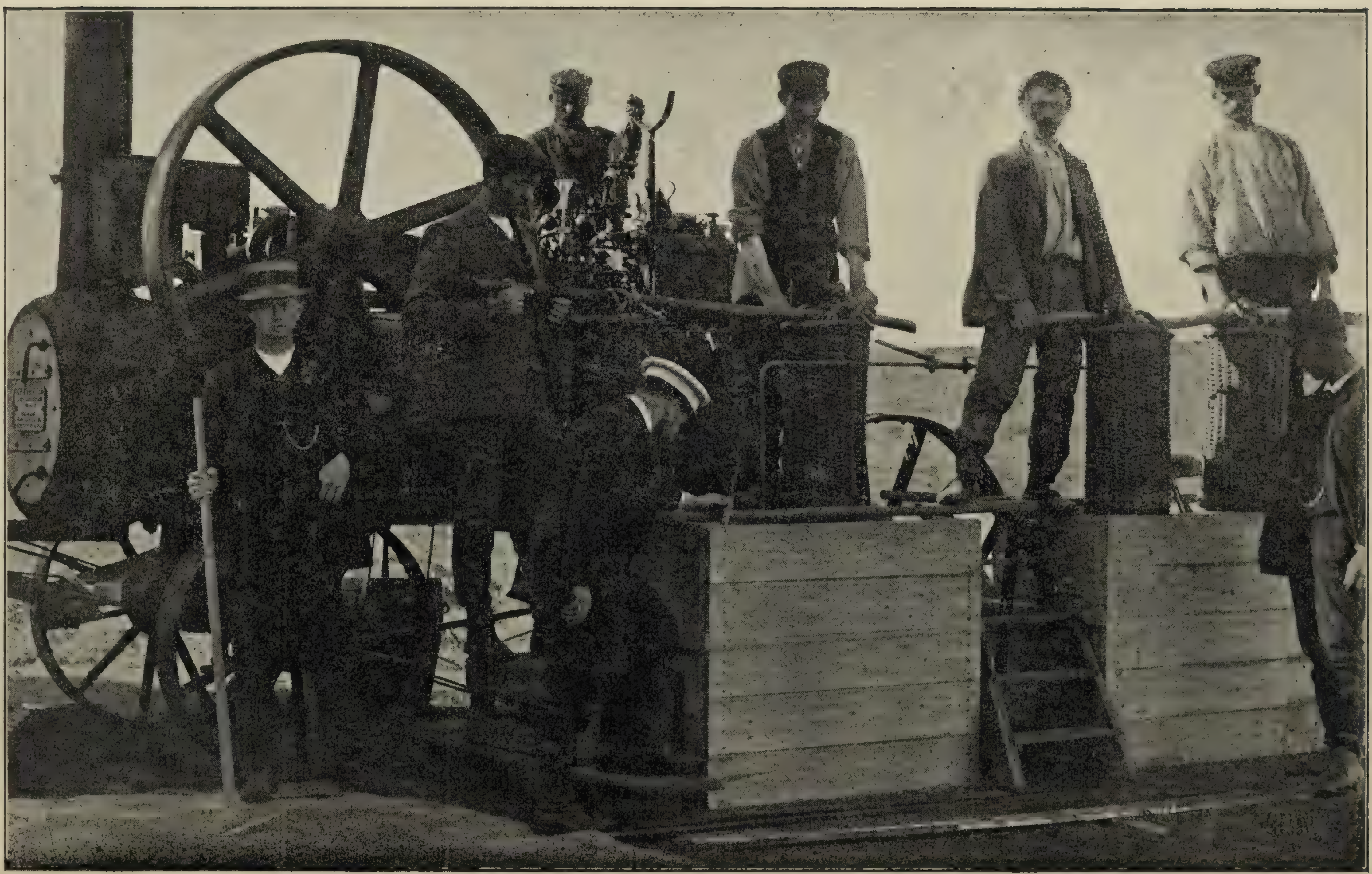
Analytical Laboratory of the State Agricultural Experimental Station at Groningen.

State agricultural and horticultural experts have fixed consulting hours, which frequently fall on market days. In a great many cases, however, written advice is given. The duties of the State agricultural and State horticultural experts naturally entail further a good deal of travelling on behalf of their district; they are for instance asked to give advice on the spot, then they must inspect the experiment fields, go to the winter and other courses, institute local inquiries, hold lectures in their district, etc. They are consequently able to keep themselves accurately informed of the agricultural and horticultural conditions in their official district, and to keep in close touch with the actual industry.

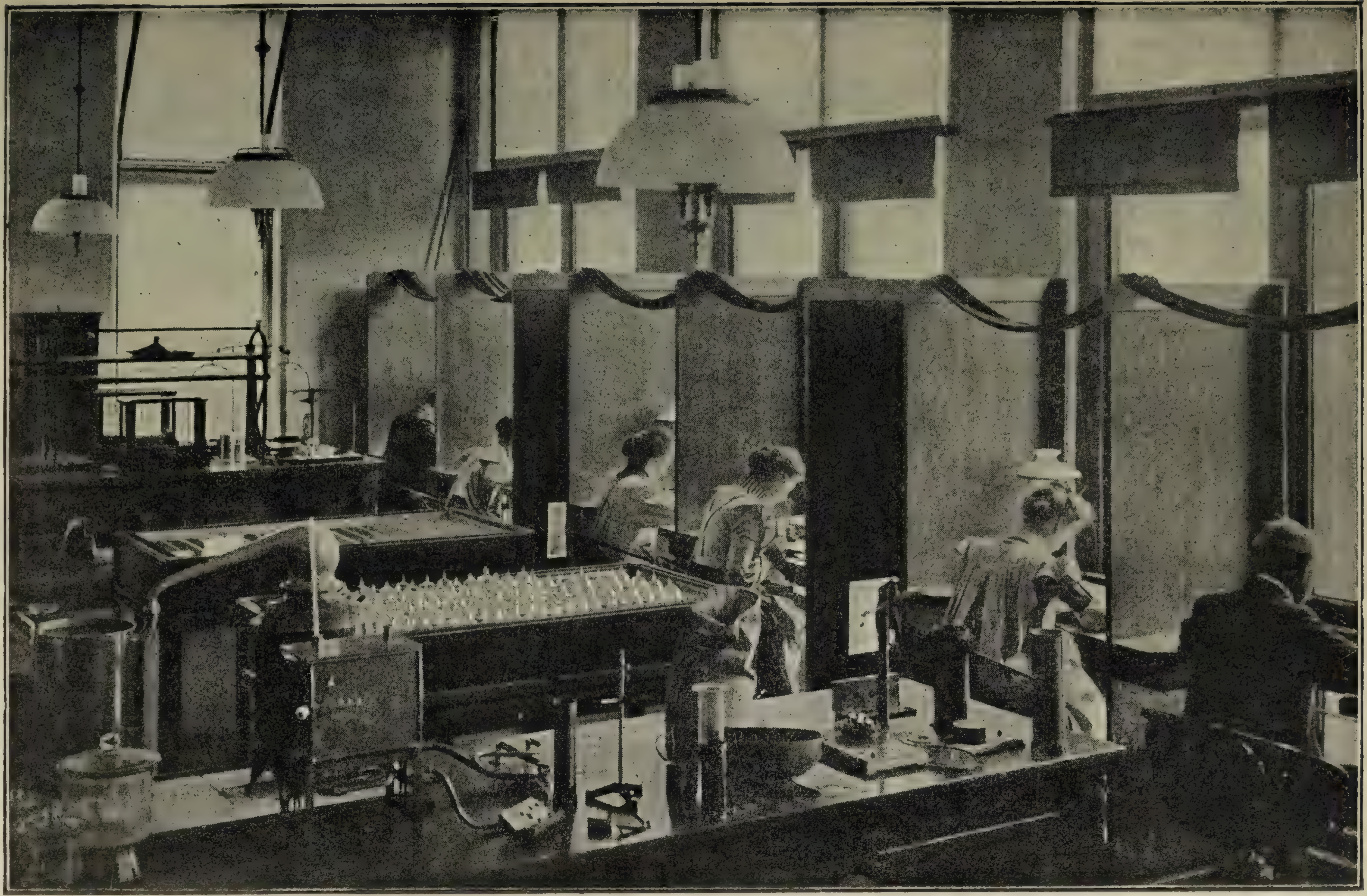
One of the most important factors in raising the technique of agriculture and horticulture to its present level, is undoubtedly the laying out of experiment fields. This indeed is one of the first means which the State has applied for the promotion of agriculture.

The State promotes the laying out of experiment fields in different ways:

1. By setting apart subsidies for compensation to experiment field holders for the money and labour expended. In 1914 disbursements under this heading came to fl. 46,440.26^5, which sum includes the costs of upkeep of experimental nurseries;
2. By charging the State agricultural and State horticultural experts with the management and supervision of the experiment fields. All these matters take up a large portion of the time of the said officers, but at the same time it assures the rational taking of the experiments, and gives the opportunity to the experts to discuss the results of the experiments with the experimenters and parties interested, while it increases their own experience as well; and
3. By circulating the results of the experiment fields. To this end the State instructs the State agricultural and State horticultural experts to make a yearly report on the results of the experiment fields in their separate



Disinfection of sowing seeds by means of hot water.



Laboratory of the State Experimental Station for Seed Control at Wageningen.

districts, and to have same printed and circulated. As it would be impossible to take due note of all the reports, many of them indeed having a purely local significance, and others being productive of no results at all, the Board of Agriculture publish in their Reports and Communications from time to time a concise review of the results of the experiment fields throughout the country which are of general interest.

As already remarked, the experiment fields have been largely instrumental in the improvement of the technique of agriculture and horticulture, and they continue to be so.

State Agricultural Experimental Station and State Experimental Station for Seed Control at Wageningen.

In the first place they are the means of bringing the improved culture methods under the direct notice of the farmers and horticulturists, and inducing them to adopt the same in their own holdings. In the early days of the experiment field this was its sole purpose, and there is no doubt that they have contributed greatly towards the now generally employed artificial fertilizers, improved species of crops, new horticultural plants, means for fighting plant diseases, etc.

Besides serving the purpose of practical demonstration, many of the experiment fields are employed for discovering in what manner an improved method of culture can best be applied in circumstances prevailing in a given district; which fertilizers should be administered to certain crops and in what quantities, taking into consideration the nature of the soil; what variety of a particular crop yields the best results in a certain district; the horticultural plants or combination of cultures best recommended for a particular place; what manner of tilling waste grounds promises the best results; in what way a particular sort of pasture land may be improved, etc.

Finally, the experiment fields have brought much light to bear upon many vexed questions respecting agricultural and horticultural matters, such as the action of the separate manures on different kinds of soil and crops, the powers of production of different crop species under varying circumstances, etc. The agricultural experiment fields are also of much service to the Institute for Improvement of Agricultural Crops at Wageningen.

The peculiar character of many horticultural plants has made the want felt in some districts of demonstrating to horticulturists and those in training as such, the culture of crops unknown to the district, and discovering the cultures or combinations thereof which may be most successfully taken up in different districts; and lastly, some means of solving practical or more theoretical problems on the subject of horticulture.

The ordinary horticultural experiment field appeared to fall short in this respect. Better means were sought after, which resulted in the institution of permanent experimental

Meadowland in the dunes on the island of Texel.

gardens by the Government, in different parts of the country. Some of the experimental nurseries are run in connection with a winter school; they thus serve a double purpose, in that they also come in useful for the education at these schools. Where they are not attached to any school, they are nevertheless under the management of an expert, and superintended by a State horticultural expert. In some districts they have wrought a complete revolution in cultivation methods by introducing horticultural elements in districts where they had been hitherto altogether unknown.

There are six State Agricultural Experimental Stations established in all in The Netherlands, to wit at Goes, Groningen, Hoorn, Maastricht and Wageningen, which town boasts of two of these institutions. The experimental stations are State buildings and kept up entirely by the State, save for the proceeds derived from the tests made on behalf of outsiders, for which there is a fixed tariff. These proceeds were estimated at about fl. 59,000 for the year 1914.

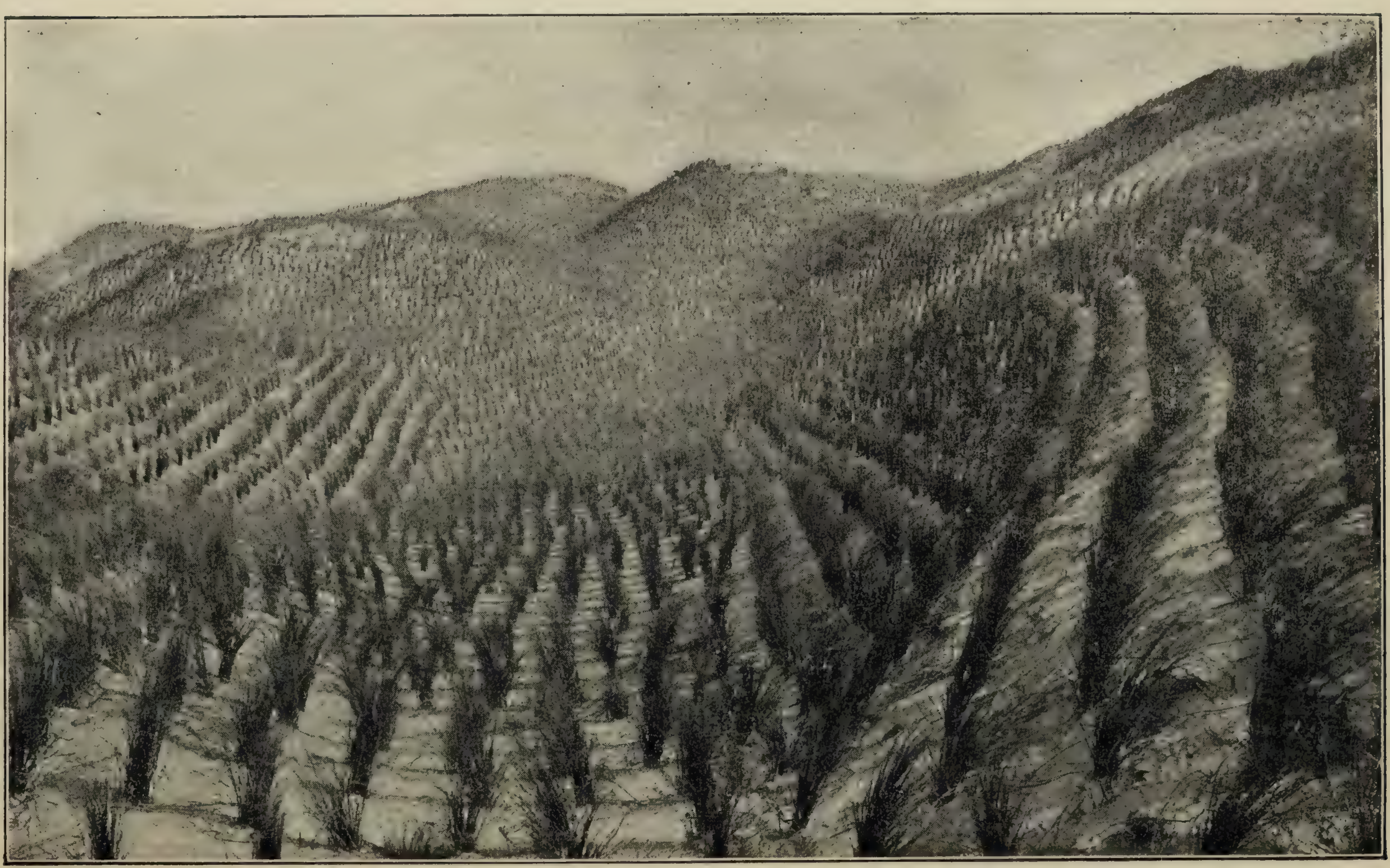
From experience gained abroad it was evident that only State-established experimental stations with uniform tariffs and testing methods would be successful. This indeed ensures the test being made on a strictly objective basis, while it further excludes competition between the several stations.

The directors collectively compose the College of Directors of the State Agricultural Experimental Station, whose chairman is nominated by the Minister.

The College hold a meeting at least twice a year. At these meetings all matters relating to the service of the stations come up for discussion.

The object of the State Agricultural Experimental Station is threefold, to wit:

1. The analysis, on request, of soils and admixtures for agricultural purposes, and of agricultural products;
2. The tracing of adulterations in concentrated food, manures and sawing seeds;
3. The institution of inquiries, and the management and execution of experiments on behalf of agriculture.



Binding of the dunes near Schoorl (North Holland) by means of broom plants.

The State Experimental Station for Seed Control is more particularly charged with the inquiry into matters relating to sowing seeds, while the remaining State agricultural experimental stations occupy themselves with the investigation of every kind of soil and admixture for agriculture, with the exception of the botanical microscopic examination of feeding stuffs, which is conducted at the State Experimental Station for Seed Control.

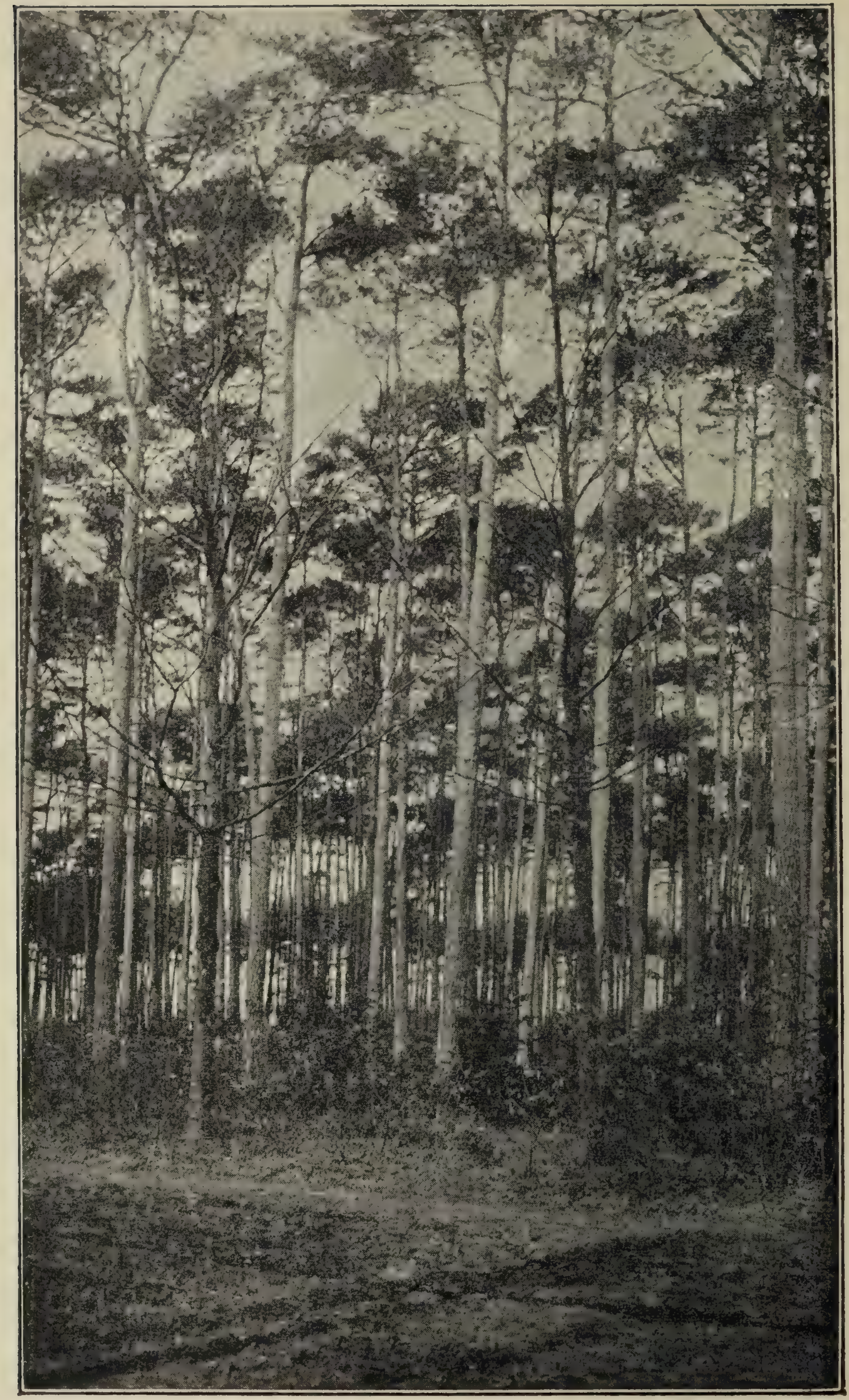
As regards N^0. 1, the so-called General Trade Conditions are now applied. These conditions are determined, in conjunction with the directors of the State agricultural experimental stations, by an association of dealers and manufacturers on the one hand, and an association acting for the agricultural association buyers on the other hand. These conditions embody a sort of model purchase contract between the buyers and sellers of agricultural requirements, due care being taken as much as possible of the interests of both parties. Disputes arising between buyers and sellers are settled by arbitration.

The stipulations contained herein may be divided into two categories, i. e.:

a. The technical stipulations pertaining to the competency of the experimental stations, and concerning, for instance, the quality and the content, correct manner of sample taking, etc.;
b. The trade stipulations relating, amongst other things, to the manner of delivery, etc., which is more an affair of parties.

In addition to the General Trade Conditions, the so-called Technical Formula has been prescribed, which determines, amongst other things, the moment when the right to restitution comes in. This, according to Art. 2 of the said Technical Formula, is the case when according to an investigation of the State Agricultural Experimental Station:

a. The goods do not come up to the quality claimed;
b. When the delivery does not come up to the guaranteed content.



Hundred-year-old pine trees in the "Mastbosch", near Breda.

The State agricultural experimental stations act upon the understanding that each delivery invariably takes place, even without its being expressly stipulated, under the guarantee that the wares will come up to the quality determined by the College of Directors in conjunction with representatatives of manufacturers and dealers, and other interested experts.

The claims regarding the quality of artificial manures and chemical fertilizers for agriculture and horticulture are contained in separate codices, as also those for indemnifications in the event of parcels being below quality.

Regarding point 2, the State agricultural experimental stations employ special officers and controllers, who, under the superintendence of the Directors of the stations, are engaged in the tracing of adulterations. The controllers take samples from sold parcels, gather local information, follow shipments, etc., in such a manner that the identity and origin of the samples are beyond a possibility of doubt. To this end they make as much use as possible of the co-operation and information of associations connected with agriculture, and of private parties.

The outcome of the investigations of samples thus obtained may first lead to a serious warning of the purveyor in question, and if this does not have the desired effect, publication of the incident may next be proceeded to, which indeed has already taken place several times.

Regarding point 3 (equally applying to the control investigation) each of the six State agricultural experimental stations is assigned a particular task. Thus we have:

1. A station for agricultural investigations in respect to arable lands in Groningen;
2. A station for agricultural investigations in respect to dairy produce and stock feeding at Hoorn;
3. A station for control examination of manures at Maastricht;
4. A station for control examination of feeding stuffs, the botanical and microscopical examination thereof taking place at Wageningen again;

5. A station for the control examination of sowing seeds, also at Wageningen; and
6. A station for the investigation of agricultural products and expedients at Goes.

The Phytopathological Institute at Wageningen is subservient to the investigation of crop diseases and insect pests, as also the extermination and fighting of these pests, and lastly to the phytopathological education at the State University College of Agriculture, Horticulture and Forestry at Wageningen.

This Institute is governed by a director who is at the same time the Chief of the Phytopathological Service. He is assisted by two upper assistants, an under assistant, a bookkeeper, an officer, two typists and an amanuensis janitor.

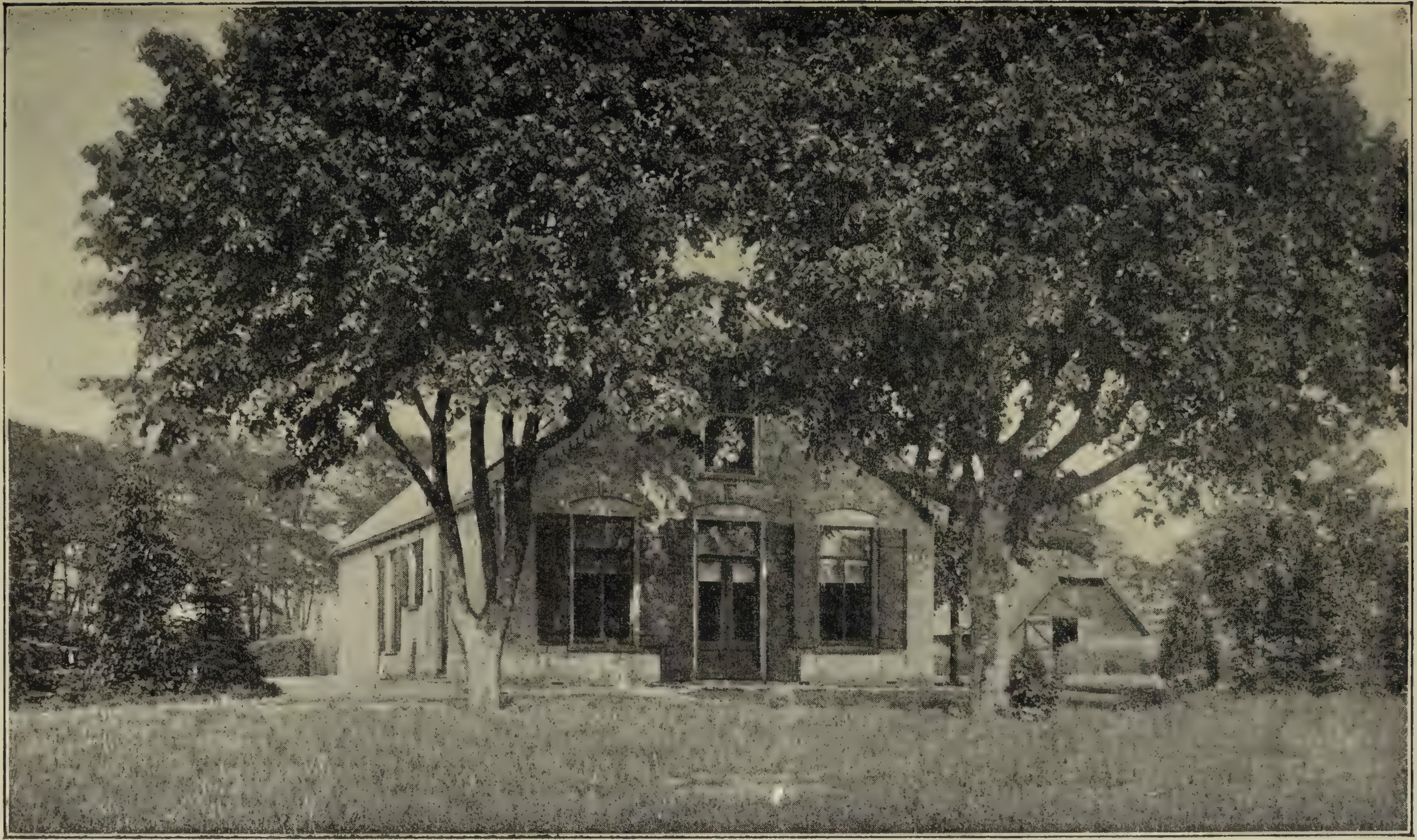
The duties of this Institute have been numerous and varied during its seven and a half years of existence.

The Government has been repeatedly advised by the Institute or its Director in all kinds of matters, amongst others in regard to the Bird Act, the Plant Disease Act, the Royal Decree relating to the prevention and fighting of the American gooseberry mildew and that relating to the regulation of the Phytopathological Service, the preliminaries of a Forest Act, etc.

Information is given to practical agriculturists, horticulturists and arboriculturists, and various officers and private persons, about the diseases and scathes of cultures and the method of fighting same.

Naturally the request for such information is usually coupled with the submitting of diseased plants or scathes for investigation.

Further, in conformity with the regulations, different more express and detailed inquiries were instituted for extension of the knowledge of plant diseases and their insect pests, and all influences hurtful to agriculture, as also the determination of the degree of susceptibility of plants to disease and injury under different circumstances. Further, means were tried for the successful fighting of plant diseases and animal pests.



A forest-ranger's dwelling at Kootwyk (Gelderland).

The Phytopathological Service consists of two distinct parts, i. e. an ordinary and a special part. The task of the ordinary Phytopathological Service comprises:

The execution of legal measures for the prevention and fighting of plant diseases and their insect pests;

The institution of inquiries in respect to the diseases of plants and the insects injurious thereto;

The estimating of, the giving of information about, and the upholding of the execution of measures for the prevention and fighting of plant diseases and their insect pests;

The circulation of literature concerning the diseases and scathes of crops, and the method of fighting same.

The special Phytopathological Service, on the other hand, conducts the inspection of lands and parcels the latter for the purpose of furnishing the certificates which some countries demand re freedom from harmful insects and fungi.

The State further takes various measures on behalf of the cultivation of the waste lands and the creation of woods. In the first place it sees to the cultivation of such waste lands (moving sands, dunes, etc.) as are detrimental to the surroundings, and the plantation of which, by reason of the heavy costs attached thereto and the less direct advantages to be gained, are not likely to appeal to the energies of private persons. In this connection the State repeatedly purchases new lands, besides maintaining the property of this kind it already owns.

A new branch of the State care of plantations and reclamation work was called into existence in the year 1907. The attention of the Government had been drawn to the fact that it was principally in the provinces of Gelderland, North Brabant and Limburg that extensive municipal properties lay waste.

As, however, the municipalities themselves were not sufficiently strong to undertake the cultivation of these lands unaided, the Government considered it desirable that they should, by means of advances free of interest and State technical assistance, be put in a position to convert these waste lands into woodlands in so far as suitable.

In the year 1897 there was first instituted on the part of the State a Regulation for the promotion of cattle-breeding, which has since been amended. This regulation was based on the standpoint that the divergent interests of cattle breeding in the various parts of the country may best be safeguarded by provincial commissions, in which the State agricultural expert, the dairy expert and the cattle-breeding expert usually take part with advisory powers. These provincial Regulation Commissions for Cattle Breeding have the disbursement of the State and Provincial monies that are devoted to this object, these monies amounting to about fl. 100,000 (£ 8,330) in all for The Netherlands, the State and the Provinces each contributing about half.

The funds which the State puts at the disposal of cattle-breeding, may be employed for various purposes, provided a plan is previously drawn up by the provincial commission regarding the disposal of the monies, which is subject to the approval of the Minister.

They may be employed for the allotment of contributions towards the support of bulls and premiums for breeding cows which have been or are to be paired with prize bulls or those inscribed in one of the cattle herd-books.

These contributions and premiums are allotted subject to tests which take place comparatively over an entire province or parts thereof, upon the understanding that only such cattle comes under consideration which by their own merits are entitled to take a prize, and which are either stationed or held in the province.

The provincial commission may prescribe in their regulations, that the prize bulls and cows must be entered in one of the cattle herd-books, or submitted for entry as such. The prize bulls must be disposable for leaping purposes in the locality or district indicated to the owners by the provincial commission. This commission at the same time fixes the duration of station and maximum leaping fee. They can further bind the owner or holder of the prize bull to give a written declaration that he will take such hygienic

An inspection of stallions at Elst (Betuwe).

precautions in respect to his bull as shall be prescribed to him by the provincial commission for preservation of the health of the stock. Before, however, the commission can proceed to this measure it must first have the sanction of the Minister.

The payment of the bull contributions takes place upon expiry of the fixed leaping period or periods, and delivery of duly filled-in leaping lists, the forms for which are furnished by the provincial commission.

The premiums for breeding cows are only allotted for cows which are in gestatory condition, or which the owner declares he has set apart for breeding; these premiums are paid after 1st August of the year following the allotment, provided the cow is, at that date, still the property of an inhabitant of the province, and has again calved or is in a gestatory condition. Premiums are not allotted if the cows have not been paired with prize bulls or those inscribed in cattle herd-books.

The contributions and premiums for prize bulls and cows also hold good in the event of the animals dying, or becoming incapacitated through no fault of the owner. This, however, must be proved to the satisfaction of the provincial commission.

The State funds may also be employed for the purchase of male, and if necessary, female breeding cattle, as also towards costs incurred through the sale of bulls, cows and calves bought for improvement of the stock, and contributions towards the expenses of associations for the promotion of improved cattle stock.

The provincial commission fixes the necessary regulations in respect to the sale, keeping and use of the purchased breeding cattle, as also the purchased cattle which is afterwards sold.

This Commission, subject to the sanction of the Minister, has the authority to append other conditions, besides those mentioned in the general regulations, to the contributions and premiums they grant.

Finally, the State monies may be employed for other outlays in the interests of cattle-breeding, and for meeting

Stable of the State Depository of foals at Bergen-op-Zoom.

the necessary costs attached to the aforesaid contributions and premiums.

Of late years the provincial regulation commissions have been making increasing use of this authority, by devoting part of the State and Provincial subsidies towards the cost of associations for improvement of the cattle stock. The breeders' and control associations, and bull keeping societies, are especially supported by this measure. These associations have considerably increased in number.

Further, the State yearly grants the sum of fl. 21,000 as subsidy for the Netherlands Cattle Herdbook, and the Friesian Cattle Herdbook.

Following the example of Belgium, this country has of late years taken steps towards the betterment of cow-houses. These measures consist chiefly in the holding of so-called stable competitions, which mostly emanate from associations receiving a State subsidy for the purpose.

The State action on behalf of horse-breeding is regulated by the Horse-breeding Act of 1901, while the Stallion Foal Depôt at Bergen-op-Zoom renders further service in promoting the above breed.

The Horse-breeding Act aims at the promotion of horse-breeding chiefly by two means:

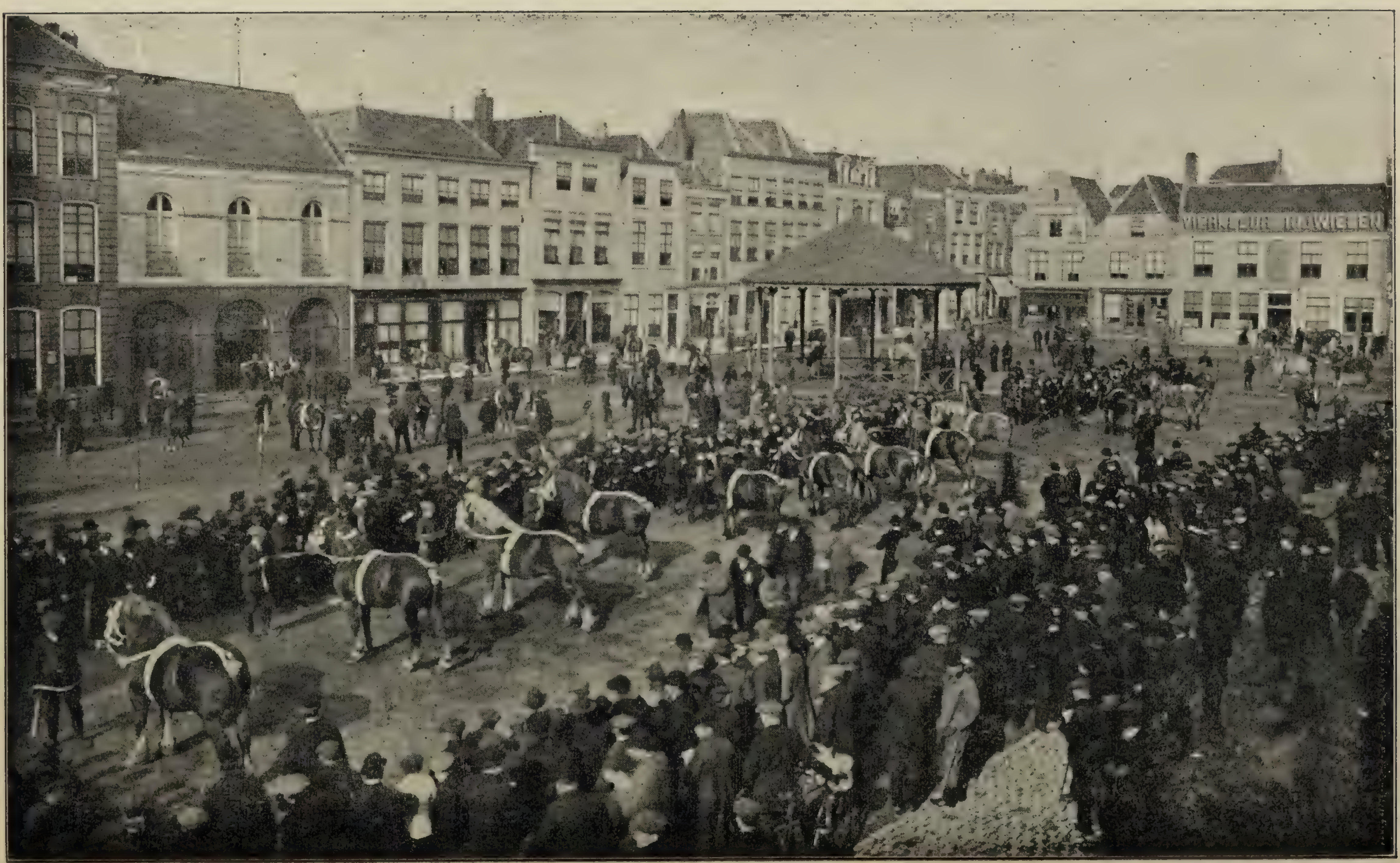
a. by prescribing a compulsory stallion test, and

b. by setting apart an annual sum of at least fl. 75,000 (£ 6,250) for grants of State subsidies for horse-breeding.

The testing of serving stallions takes place through the medium of a general testing commission, while the care of the proper outlay of the State allotments in each province is entrusted to a provincial regulation commission appointed by the Deputed States.

The division of the funds allotted for subsidies over the different provinces is all according to the number of mares served by approved stallions in each province during the year.

The subsidies must be employed for the allotment of:



An inspection of stallions at Goes (Zeeland).

1. premiums for serving stallions of 3, 4, 5 and 6 years old;
2. small premiums for serving stallions of 7 years old and older;
3. contributions towards keeping of stallions of at least three years old;
4. contributions for keeping of stallions under two years of age;
5. premiums for mares under eight years old with foal;
6. small premiums for eight-year old mares and over, with foal;
7. contributions towards keeping foals indicated under 5 and 6;
8. contributions towards keeping of mares of 1, 2, 3, 4, 5, 6 and 7 years old;
9. contributions towards losses incurred in the sale of stallions, mares and fillies purchased at home or abroad;
10. premiums for harness or riding cover stallions and covered mares, inscribed in one of the public stud books in this country; and
11. subsidies for meeting the costs of horse shows open to competition for the different provinces.

The State Foal Depôt at Bergen-op-Zoom makes a yearly purchase of a score of stallion foals, which if developping as desired and pronounced fit, are publicly sold when three years old.

In almost every province there are special commissions appointed which are charged with:

a. the apportionment of monies for the promotion of pig-breeding;
b. the management of State subsidies;
c. the supervision of the manner of expenditure, and
d. the issue of the yearly report to the Government. The State subsidy is chiefly spent in the support of breeding and serving stations.

The Government measures on behalf of sheep-breeding are so far only slightly developped, and confined chiefly to subsidies to the provinces of Groningen, Friesland and

An inspection of goats.

North Holland, for the holding of tests, keeping of a herd-book and other measures for the promotion of sheep-breeding.

The measures for the promotion of *goat-breeding* take a more comprehensive course. In 1912 the sum of fl. 6,425 was granted as State subsidy. The disbursement thereof is usually entrusted to provincial or more local commissions for the promotion of goat-breeding. These commissions employ the State and other monies set at their disposal principally for the foundation and support of associative action in the shape of he-goat and she-goat holdings. The Government further supports the importation of breeding goats. As a consequence there were 159 he-goats and she-goats imported in 1910, while another 257 breeding goats were imported through associations in Limburg.

The development of poultry-keeping is promoted by the grant of a subsidy of fl. 6,000 to the Association for the Promotion of Poultry-keeping and Tame Rabbit-keeping in The Netherlands, half of the sum being taken up by the salary of a poultry-keeping expert.

The Government endeavours on behalf of apiculture are confined to the grant of a subsidy of fl. 3,500 to the Association for the Promotion of Apiculture, which amongst other items covers the salary of a teacher.

While in the majority of the provinces of the country the care of the interests of stock holdings is included in the duties of the State agricultural experts and dairy experts, in a few provinces there are special live stock breeding experts or special small cattle breeding experts appointed. According to the instructions the live stock breeding expert must exclusively devote himself to looking after the interests of the live stock and small cattle holdings within his field of office.

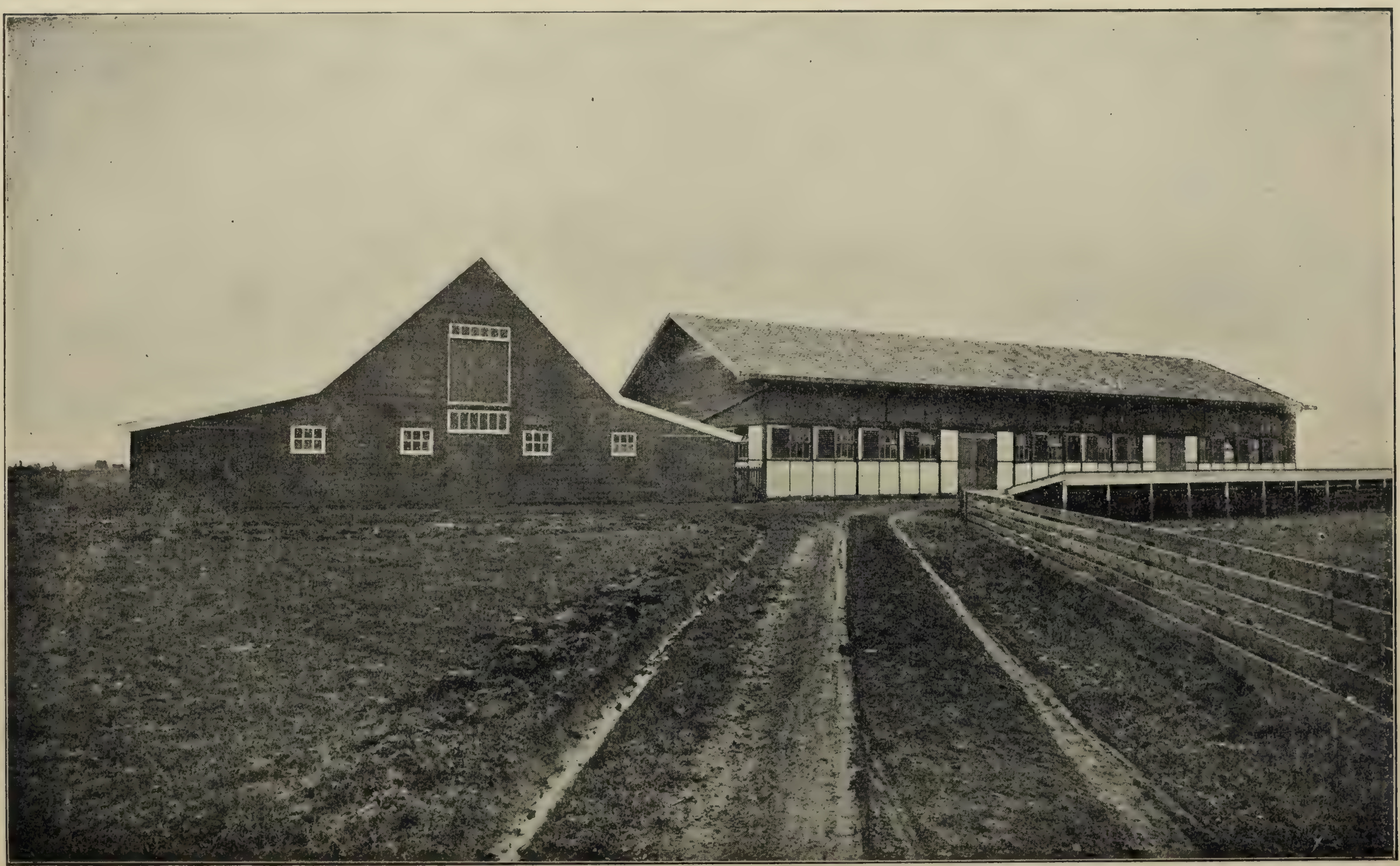
Amongst other things he is entrusted with:

a. the giving of advice to associations or private persons upon all matters connected with stock holding;

b. holding of lectures;

c. holding of courses;

d. visiting of tests and shows of breeding stock within his district, and the performance of his duties in connection therewith; and



The State Serum Institution. Meadows with stables for horses and cattle.

e. the promotion of associations relative to stock breeding.

On the 20th July, 1870, a law was passed in The Netherlands for the regulation of the Veterinary Surgical State Supervision and the Veterinary Surgical Police.

In accordance with this law the Veterinary Surgical State Supervision comprises:

a. the inspection of the general condition of the health of the stock, and the indication and promotion of means of improvement, where such may be necessary; and

b. the upholding of the laws and regulations determined upon in the interest of the general condition of the health of the stock.

The above is entrusted, under the nomination of the Minister of Agriculture, Industry and Trade, to district veterinary surgeons, who are appointed from holders of certificates qualifying them to act as veterinary surgeons on the part of the State. They fulfil their office under the direction of the Inspector of the Veterinary Surgical Service, which is connected with the Ministry of Agriculture, Industry and Trade. Their stations, as also their spheres of action, are assigned to them by the Minister. For each district veterinary surgeon there are several substitutes appointed, who may take up the duties in the event of total incapacity on his part. The district veterinary surgeons receive a fixed salary out of the public exchequer, besides the refunding of office, travelling and hotel expenses. They do not practise the art of veterinarian, and hold no other office without permission of the Queen. The substitute district veterinary surgeons are qualified to act as such. They receive no salary but have their travelling and hotel expenses refunded to them.

Upon the outbreak of contagious live stock diseases the Queen may appoint temporary district veterinary surgeons.

These officers receive a salary besides the refund of office, travelling and hotel expenses, while they are allowed to exercise their profession of veterinary surgeon.

There are now fourteen district veterinary surgeons

Expedition department of the State Serum Institution.

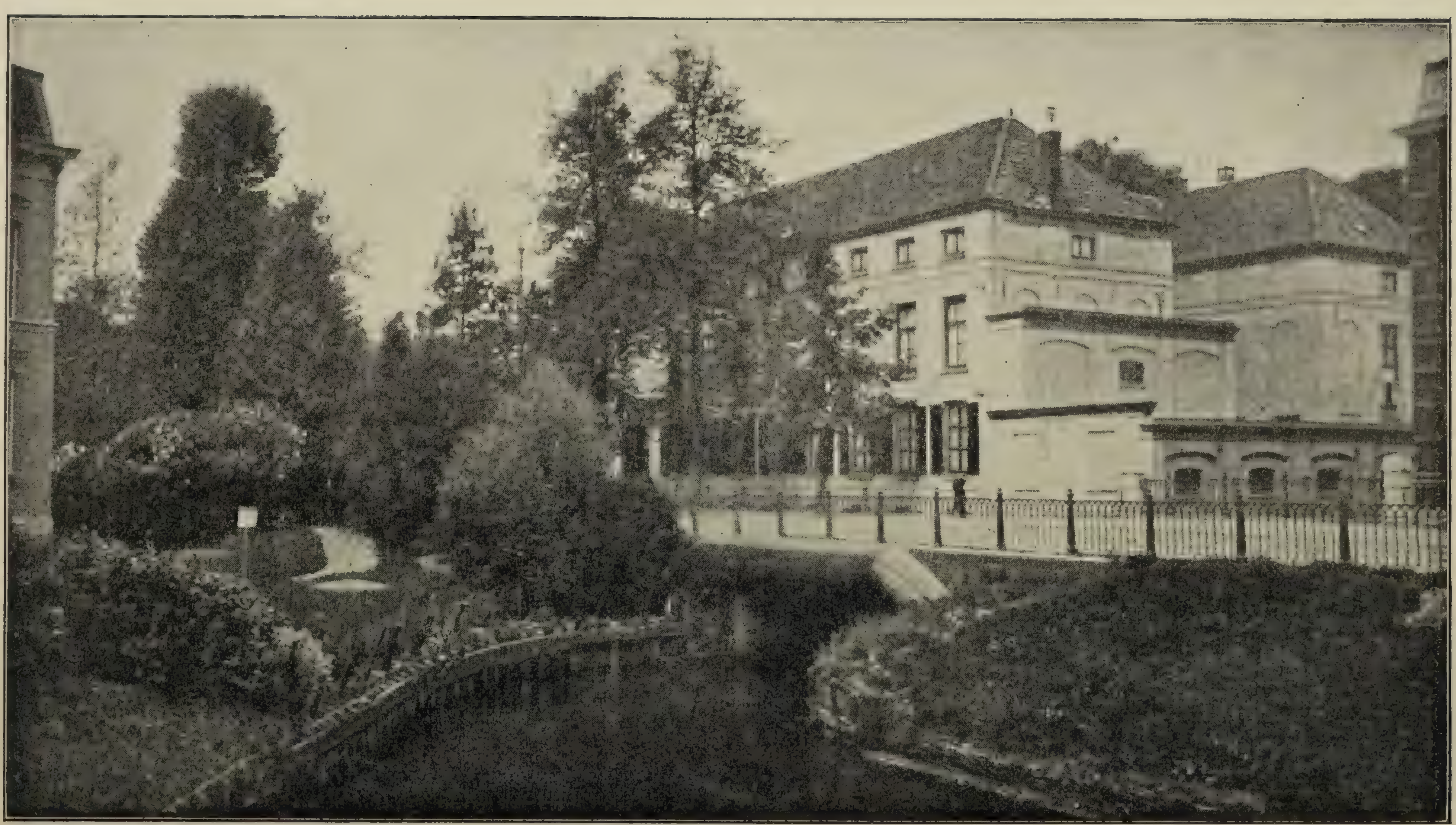
holding appointments in this Kingdom, one of whom is engaged as Inspector of the Veterinary Surgeons Service, while there are about 200 substitutes.

The following are included amongst the contagious cattle diseases:

1. Rinderpest;
2. Pulmonary diseases;
3. Foot and Mouth disease;
4. Malignant glanders and filaria medinensis of solipeds;
5. Scabies (sarcoptes-scabies and dermatocoptes-scabies) of solipeds and sheep;
6. Sheep pox with sheep and goats;
7. Ergotism;
8. Swine fever;
9. Trichina;
10. Splenic Fever of all animals;
11. Rabies of all animals.

The Netherlands has not been visited by the rinderpest since the year 1867, while the pulmonary disease, which first appeared in The Netherlands about the year 1830, was stamped out by the year 1885. A solitary case or two in 1886 and 1887 occurred with imported cattle. The pulmonary disease lingered longest in the South Holland distilling district, where inoculation was the means applied for fighting against the disease. When, however, in this last infected locality the infected or suspected animals on the holdings where the pulmonary disease showed itself began to be killed off, it soon appeared that this was the only way of stamping out the disease; in fact, it has not occurred in this part of The Netherlands since the year 1885.

Epidemics of foot and mouth disease occur periodically. In The Netherlands it has also been proved that with due precautions for isolation and disinfection foot and mouth disease can be stayed, that is to say if the affair is nipped in the bud. According to Netherlands law the killing-off of diseased or sick animals is permissible. This permission has been made free use of during the last few years, and the conviction that the killing-off of sick and suspected cattle,



View of the State Veterinary Surgeons' College at Utrecht.

judiciously applied in the early stage of the disease, is the best means of fighting the foot and mouth disease, is steadily gaining ground.

Malignant glanders may also be said to have disappeared from The Netherlands. Where cases still occur, they always originate from imported animals, or animals infected thereby.

Scabies rarely attack horses in The Netherlands; sheep however are not infrequently infected with this disease in a few provinces.

Since the year 1893 not a single case of sheep pox has occurred in The Netherlands. This disease, in special cases, can also be stamped out by killing off the infected animals.

Ergotism occurs chiefly in the province of North Holland. It is very rarely met with in the remaining provinces.

Swine fever is indigenous to The Netherlands; it is principally fought against by means of preventive and curative inoculation with inoculating matter and serum, both of which are prepared by the State.

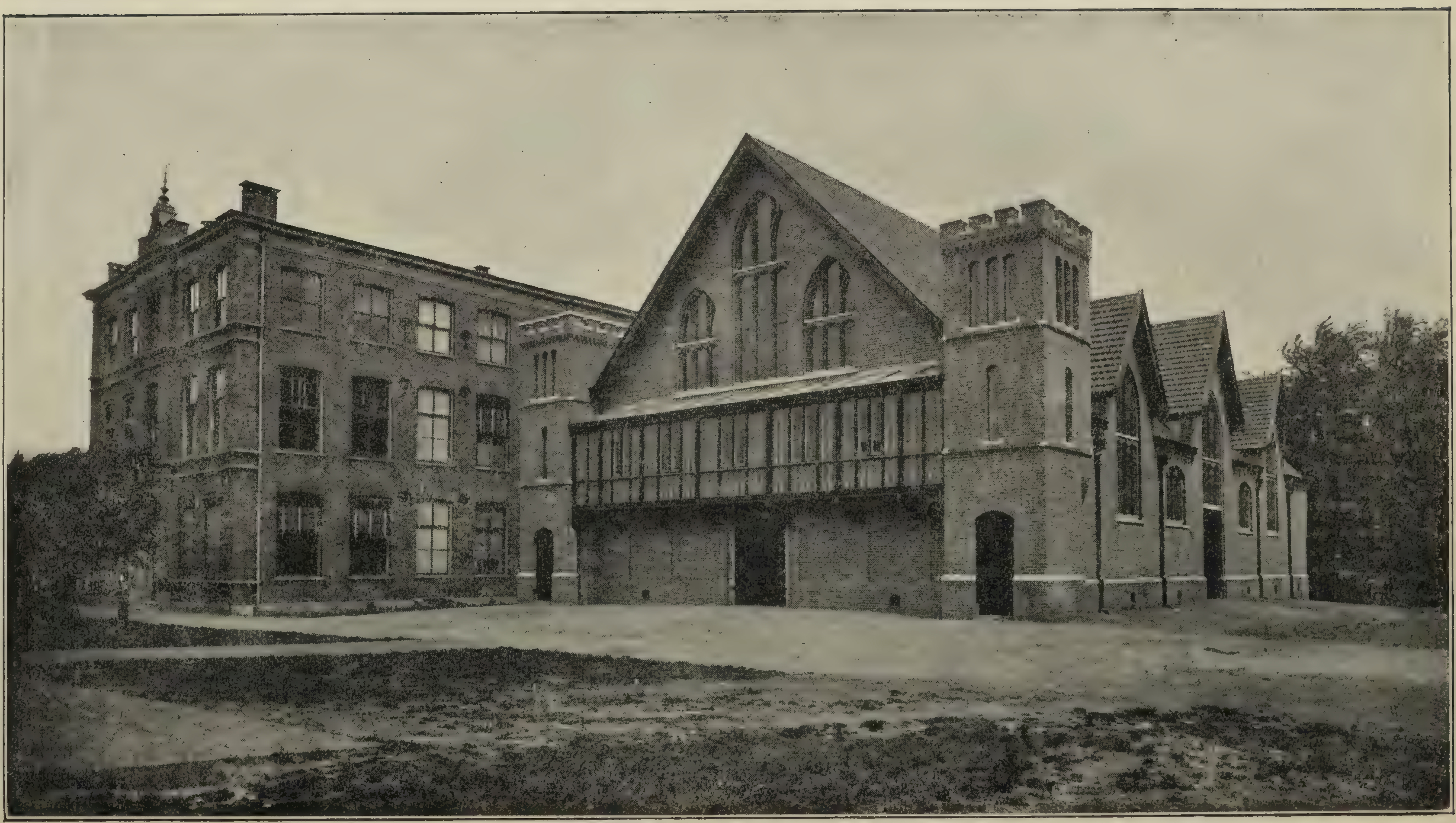
Hog trichine is of the rarest occurrence. Animals suffering from this disease are expropriated by the State and destroyed for its account.

As regards splenic fever the carcasses are rendered innocuous by burning. As with swine fever, the matter and serum prepared by the State is frequently applied.

Rabies amongst cattle seldom occurs. Cattle attacked thereby are killed off by the State, and suspected animals as well, should the Burgomaster be advised to do so by the district veterinary surgeon. Moreover, there is a law in force relating to rabies amongst cats and dogs. Mad dogs and cats or those bitten by a mad animal, are immediately destroyed by order of and under superintendence of the Burgomaster or Commissary of Police.

The veterinary police surgeons are, in respect to army horses, governed by a separate law of 2nd June, 1875 (*State Gazette*, No. 44) in connection however with the former existing law of 20th June, 1870 (*State Gazette*, No. 131).

By Royal Decree of 8th December, 1870, the import and transit of cattle, sheep, he-goats and she-goats is



The education building and the manege of the State Veterinary Surgeons' College, with riding-school, at Utrecht.

forbidden, while by Royal Decree of 14th August, 1888, the import and transit of hogs was forbidden. Without dispensation none of the animals mentioned in the above Decrees may be imported in The Netherlands or be carried in transit. The import and transit of horses is in so far regulated, that animals from Great Britain and Ireland are subject to test, while the import may only take place with due observance of the special regulations in connection therewith. For horses imported from Belgium a declaration must be given that the animals in question have already been in Belgium for the space of three months. The regulations do not apply to horses which are destined for the Netherlands Army.

Cattle for exportation by sea are tested by Government test masters previous to being embarked. Cattle for exportation by rail to certain countries are subjected to the test of a certificated veterinary surgeon, likewise, previous to being loaded.

Moreover, there are also in force in The Netherlands certain minor laws, numerous Royal Decrees and Ministerial orders, which regulate different subdivisions relating to the veterinary police surgeon force.

The measures for fighting tuberculosis amongst cattle came into force on 1st January, 1905, pursuant to a Royal Decree of 2nd September, 1904 (*State Gazette*, No. 219). In virtue of the said Decree about 27,000 cattle which showed symptoms of clinical tuberculosis were destroyed for account of the State in a period of six years. The considerable costs attached to this method of procedure, and which, as it was thought, were out of all proportion to the advantages, led to the said Decree being substituted by the Royal Decree of 1st December, 1910 (*State Gazette*, No. 364), whereby new stipulations for the furtherance of the fight against tuberculosis amongst cattle were determined.

Whereas the former Decree ruled that only the animals suffering from clinical tuberculosis were to be expropriated by the State and killed for its account, and whereas the State in its efforts against tuberculosis was wholly unaided, the stipulations of the new Decree were based on a different basis, i. e. that the cattle holder himself should take the

The State Veterinary Surgeons' College at Utrecht: View of the clinical building.

matter of fighting the disease amongst his stock seriously in hand, and receive support for the purpose from the State. The task of the State is twofold in this case, i.e.:

1. general action towards imbuing the cattle holder with healthy ideas in regard to the general hygiene of the stable, the care and breeding of the cattle, and
2. particular action for support of those cattle holders who have the inclination and the power to take up the fight against tuberculosis, and are willing to sacrifice some money for the cause.

Under the present methods the opportunity is afforded to cattle breeders, preferably those who are members of breeders' associations, of receiving State support towards the fighting of tuberculosis amongst their cattle, always provided that their cow-houses can satisfy reasonable hygienic claims.

For the attainment of this object the following conditions must be complied with:

1. The young cattle, the so-called breed, must be bred free of tuberculosis and kept apart from the rest of the stock; to this end they are fed on pasteurized milk or whey, or milk which has been tested and found to be harmless for the animal. The animals thus bred free of tuberculosis, form the basis for the new healthy stock.
2. The old cattle stock must be separated from animals suffering from clinical tuberculosis. For this purpose the entire stock are, head by head, examined by veterinary surgeons appointed for this purpose, and the clinically sick animals are expropriated by the State. This examination takes place several times a year.

The stipulations of the above-mentioned Royal Decree have been in force since the spring of 1912, and the above outlined combative methods are now applied on about seventy farms in The Netherlands.

With a view to offering powerful support towards the development of the meat trade to foreign countries, and

Laboratory of the State Serum Institution.

preventing the transportation of bad meat, the opportunity was offered, with the Royal Decree of 21st November, 1902, (*State Gazette,* No. 199), of having the meat destined for export subjected to examination, for the obtainment of a mark in token that the meat had been pronounced fit for exportation. This test was thus optional. On the 1st April, 1903, meat so marked in token of satisfaction was first shipped, with the result that a number of exporters speedily resolved to voluntarily subject their meat to the State test previous to its exportation. Test stations were successively established at Hook of Holland, Oss, Assen, Rotterdam, Eyndhoven, Flushing, Harlingen and Nieuwerkerk on Yssel.

Where in 1903 the meat of 97,939 animals had been subjected to a test both before and after slaughter, this number rose:

in 1904 to 354,084;
„ 1905 „ 399,321;
„ 1906 „ 459,726;
„ 1907 „ 579,456;
and „ 1908 „ 629,495;

while during the period from 1st January to 1st May, 1909, 358,925 animals were tested.

Although there was every reason to look back with satisfaction upon the working of the above-mentioned Decree, yet by reason of the optional character of the system laid down in the Royal Decree of 21st November, 1902, it was by no means possible to prevent the transportation of bad meat, whereby the reputation of our meat market suffered considerably.

The appreciation which the measures taken by the Government met with on the part of the British sanitary authorities, as appeared from reports of the Medical Officer of Health for the City of London; the conviction which became established abroad, that the exportation of sound meat engaged the serious attention of The Netherlands; and the faith which the Government mark had awakened meanwhile formed an incentive towards converting the optional stipulations into a decree of compulsory nature. This took place

Inspected export pigs, with mark affixed thereto.

by the Act for testing of meat destined for export, of 1907 (*State Gazette*, No. 217), which forbade the exportation of untested meat to the countries indicated by the Crown.

The countries to which it was forbidden to send untested meat, as indicated by Royal Decree of 6th May, 1908, were Great Britain and Ireland; however, it may be expected at any moment that the Act will also apply to the exportation to other countries.

Preserved meat, and meat either in railway carriages, or on ships or rafts destined for consumption of the persons thus conveyed, are exempt from the test.

This Act came into force on 1st May, 1909.

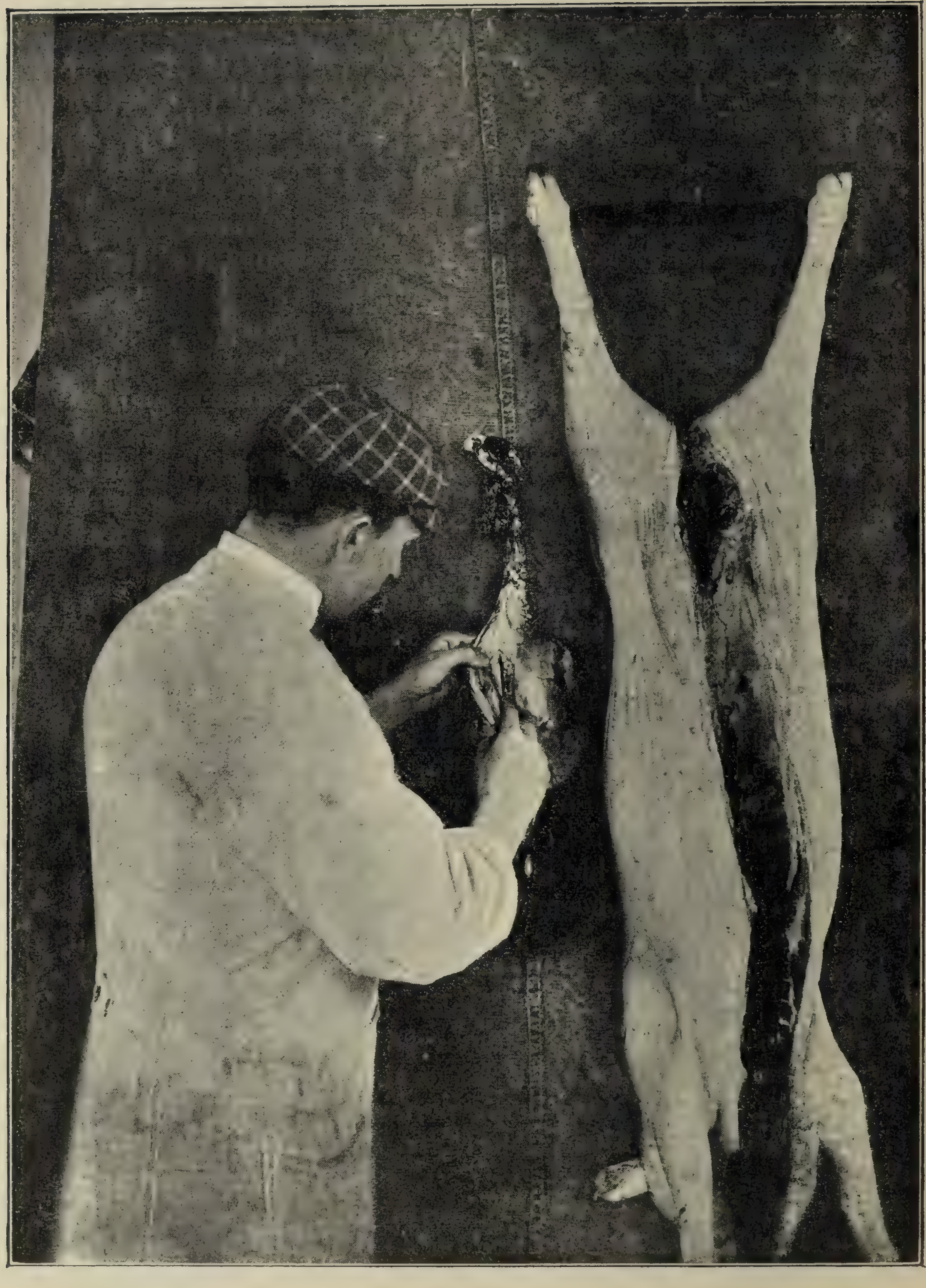
Par. 2 of the Royal Decree of 24th June, 1908, No. 50, enumerates the claims which a slaughter-house must fulfil in order to take part in the test service. Seeing that at the time that this law came into force a considerable number of the abattoirs fell short of the above indicated requirements, release from one or more of same was given until 1st October, 1909.

In June, 1909, there was instituted the optional testing of slightly salted hogs' flesh — so-called bacon —, and by Ministerial Order of 18th October, 1909, the mark therefor, and the place of application were determined. It soon appeared desirable to also change the optional measures for bacon into compulsory stipulations, which was carried out under Ministerial Order of 30th December, 1910, whereby the shipment of untested bacon to Great Britain and Ireland was forbidden.

In the commencement of 1911 the round mark which had been prescribed for the stamping of bacon was substituted by a three-cornered stamp, the shape and size of which, as also the place of application, were determined by Ministerial Order of 17th January, 1911.

Sixty slaughter-house test services were instituted from Jan. 1st, 1913, the tests being performed by fifty-five State Testmasters, and ninety-four State Assistant Testmasters.

Pursuant to Royal Decree of 11th September, 1908, No. 41, which came into force 1st May, 1909, the opportunity



An inspector at work.

is offered by the State for the testing, and if desired, also the tuberculining of cattle, with a view to the obtainment of a certificate that the animals have been passed as fit for export. Those who desire to avail themselves of this opportunity must send in a petition to the Board of Agriculture accordingly, the forms for which are issued gratis by the Minister of Agriculture, Industry and Trade. The testing and tuberculining are performed by veterinary surgeons appointed by the Sovereign, who hold the title of State Veterinary Surgeon.

A review of the head of cattle subjected to test as per regulations of Royal Decree of 11th September, 1908, brings out the following facts:

1909. In this year 5,708 head of cattle were exported under this certificate. Of these 5,458 were destined for Italy, and the remainder for Brazil, Galicia, Japan, Mexico, Norway, Russia and South Africa.

1910. During 1910 there were 13,444 head of cattle exported; of these 13,080 went to Italy, and the remainder to Argentina, Brazil, France, Galicia, Norway, Austria, Netherlands East Indies, Portugal, Russia and South Africa.

1911. In this year the export of cattle, in view of the foot and mouth disease prevalent in this country, was unimportant. Exportation to Italy took place exclusively during the first three months of the year.

In 1911 there were 74 head of cattle tested and tuberclinated, while 612 were tested only.

1912. The foot and mouth disease was again the cause of the fewness of animals presented for testing. In this year there were 149 head of cattle tested and tuberclinated; 113 of these were approved and exported, including 72 to Brazil, 10 to Japan, 6 to Java, 1 to Russia and 24 to South Africa. Six hundred and ninety-four head of cattle were tested only, of which 675 were approved, the entire number being exported to Italy.

In 1913 the number of cattle exported under certificate was 706 : 529 to South-Africa, 102 to Italy, 53 to Brazil, 15 to Japan and some to other countries. In 1914 the export under certificate was smaller than in 1913. In total the number was 343. 200 of these were destined for South Africa, 56 for Italy, 60 for England, 9 for Argentina, 5 for Chili, 5 for Cuba, 4 for Havanna and 4 for Montevides.

The chief object of the State Serum Institute is to make the more modern veterinary science relating to the contagious diseases of live stock, of direct service to agriculture.

In this connection the Institute extends free advice to the public generally on matters concerning the hygiene of domestic animals; it endeavours to trace the causes of diseases attacking animals which are so far unknown; and sets the vaccine and serums prepared in its laboratories at disposal for the prevention or curing of cattle diseases. Of this privilege the farmers make free use.

Although the Institute was founded with the idea of conducting the preparation of the different serums and vaccines, the significance of the Institute as regards the fighting of cattle diseases is much greater by reason of the free inquiry department on behalf of the Veterinary Service, veterinary surgeons and agriculture.

The above opportunity was scarcely instituted before a string of requests ensued for examination of all manner of diseased animals or organs thereof.

In many cases the attempts at tracing the cause or nature of the disease have been successful, and upon several occasions counsel has been given which has resulted in the curing or prevention of the disease.

An important step forward was the establishment of a separate department for chemical research; by this means the origin of cattle diseases needing the powers of the analyst could be traced. At the same time the opportunity was opened for the study of different biochemical problems relating to live stock diseases.

Subsequently the opportunity was offered for inquiry into the constituents of patent remedies recommended for diseases of cattle or crippling of horses

A department was opened up for the culture of bacteria, which was at the disposal of the entire Netherlands, with a view to the extermination of mice and rats.

Inquiries were also instituted in regard to the origin of fish and bees' diseases.

As showing the significance of the State Serum Institute we may record the ever-increasing number of animals which are inoculated each year with the matter prepared at the State Serum Institute.

In 1904 about 40,000 animals were inoculated;
„ 1905 „ 100,000 „ „ „ ;
„ 1906 „ 200,000 „ „ „ ;
„ 1907 „ 225,000 „ „ „ ;
„ 1908 „ 300,000 „ „ „ ;
„ 1909 „ 300,000 „ „ „ ;
„ 1910 „ 325,000 „ „ „ ;
„ 1911 „ 440,000 „ „ „ ;
„ 1912 „ 406,000 „ „ „ .

At present the State Serum Institute undertakes the preparation of the following vaccines and serums:

a. Serum against pulmonary disease of horses;
b. Prophylactine against pulmonary disease of horses;
c. Serum against non-malignant glanders of horses;
d. Tetanus serum;
e. Splenic fever serum and vaccine;
f. Vaccine against scapulodynia;
g. Serum against scapulodynia;
h. Serum against foot and mouth disease;
i. Serum against colibacillose of calves;
k. Serum against septic pleuro-pneumonia of calves;
l. Serum and vaccine against the infectious casting of cows;
m. Serum and vaccine against diseases of the udder;
n. Serum and vaccine against swine fever;
o. Prophylactine against typhus fever;
p. Serum and vaccine against disease of the chest of hogs;
q. Serum and vaccine for fowl cholera;

r. Serum and vaccine against inflammation of the uterus of cows, i e. against pyobacillose and streptomycose of the uterus;
s. Serum and vaccine against inflammation of the uterus of mares;
t. Serum against hog cholera; and
u. Serum and vaccine against the "Klein" Poultry Disease.

MEASURES RELATING TO THE DAIRY INDUSTRY.

The instructions of the Dairy Expert are that he must devote himself exclusively to the interests of dairying and cattle-rearing, and everything connected therewith. Amongst other things he is entrusted with:

a. The holding of lectures;
b. The conducting of courses in dairy work;
c. The giving of advice and information to associations or private persons, upon all matters relating to the dairy industry;
d. Assistance in the foundation of dairies and cheese factories;
e. The training of able employees for the dairies and cheese factories;
f. The testing of milk, particularly with a view to the elimination of less desirable cows from the industry;
g The testing of dairy produce;
and further with the performance of all duties laid upon him by the Provincial authorities.

The information he gives on matters concerning the dairy industry is free of charge, while the lectures delivered by him are free to all.

There are twelve dairy experts appointed in all, to wit one in each province, with the exception of North Brabant, where two dairy experts are at work.

Almost all the dairy experts are State officials; it is only in a few provinces that they are appointed by the provincial authorities or an agricultural company, with a subsidy from the State.

Laboratory of the Butter and Cheese Control Station at The Hague.

Most of the dairy experts have one or more assistants at their disposal, chiefly for milk testing at the laboratory.

In order to remain in mutual touch and to preserve the necessary contact with the Government, two meetings of dairy experts are held yearly, these being under the chairmanship of the Inspector in the general service of the Board of Agriculture. The various matters are there discussed which relate to the duties of dairy experts.

In order to convey an idea of the work, and at the same time of the influence which the dairy expert brings to bear upon the dairy produce and cattle-breeding industries, we append a short review of what is done in this direction, together with certain statistics relating to the last few years.

I. *Education.* Education and directions are given by the dairy expert in a variety of ways, all according to circumstances, comprising amongst others:

a. Courses for milk controllers as a means of obtaining able employees for control and cattle breeders' associations;
b. Courses for the employees of dairies and cheese factories, as preparation for examinations (F. N. Z.) or for the securing of separate diplomas. Amongst these are included the industrial school for cheese makers in North Holland and the courses for cheese and butter makers in other provinces;
c. Courses for study of cattle;
d. Milking courses;
(From 1907 to 1911 there were 178 courses conducted as indicated under *a*, *b*, *c* and *d*);
e. State Agricultural Winter Schools, in so far as these are established in the provinces concerned;
f. Courses for teachers qualifying for the elementary agricultural education certificate; and
g. Domestic economy courses for farmer women.

Further, the dairy experts give lectures on divers subjects concerning the dairy or cattle-rearing industry,

State Dairy Station at Leyden.

the extent of their activities in this direction being shown by the accompanying statistical table:

YEAR.	Number of lectures on subjects relating to the dairy industry.	Number of lectures on subjects relating to cattle rearing	Total No. of lectures.
1907....................	107	70	177
1908....................	104	48	152
1909....................	81	61	142
1910....................	93	79	172
1911....................	73	91	164
Total........	458	349	807

These lectures were attended by over 51,000 persons.

Finally, we may state that the dairy experts repeatedly take part in examination commissions when dairying is included in the subjects of examination.

II. *Improvement of dairy produce.* The giving of information on dairy produce (milk, butter, cheese, etc.) is one of the most important duties attached to the office of dairy expert. For the prevention of industrial disturbance the places of preparation are constantly inspected, and means of improvement indicated. The assistance of the bacteriological department of the State Agricultural Experimental Station at Hoorn is frequently in request. The assistance is above all resorted to in the provinces where the dairy industry still takes place on the farm, as also in the districts where cheese-making is carried on extensively.

The dairy experts further endeavour to raise the quality of dairy produce by indirect means, amongst others by the organization or support of butter and cheese tests, stable competitions, milking courses and milking competitions, and by the giving of information regarding the purchase of feeding stuffs.

Information is given both verbally and in writing. Moreover, the experts endeavour to spread increased knowledge on dairy produce by publishing articles in trade papers, and by the writing and issue of pamphlets.

The dairy experts further pay constant care to the installation of dairies and cheese factories. New factories are established under their guidance, those in existence improved, and handpower dairies converted into steam dairies.

III. *Investigation Work.* This chiefly comprises:

a. Investigation of milk as regards efficiency of quality for butter and cheese making;
b. Investigation of constituents of milk on behalf of control and breeders' associations, or for control of dairy factories;
c. Investigation of milk in reference to adulteration;
d. Investigation of butter and cheese;
e. Investigation of water employed in dairying or as drinking water for the cattle;
f. The control of instruments and chemicals required for the investigation of milk or dairy produce.

The following table conveys the extent of the investigation work performed by dairy experts during the last few years:

YEAR.	No. investigations re dairy produce.	No. investigations re milk.	No of other investigations.	Total.
1907	1,558	54,430	1,088	57,076
1908	2,299	66,886	1,538	70,723
1909	2,059	85,938	1,920	89,917
1910	1,494	146,439	1,349	149,282
1911	1,117	107,637	2,402	111,156
Total	8,527	461,330	8,297	478,154

IV. *Promotion of Organization in Connection with Dairying and Cattle Rearing.* The dairy experts take an active part in different organizations, such as: butter and cheese control stations, dairy federations, bull holdings, breeders' associations, control associations, and goat breeding. Of many of these organizations they were the founders, mostly in conjunction with the State agricultural experts, or initiated their establishment. In many cases they perform committee functions, and are charged with part of the administration, acting further as advisers or else supervising the business.

In many districts the existence of numerous bull, control and breeders' associations are due to their efforts.

The control of the milk content is rendered possible in several provinces — in the first place by their training of able assistants for the control and breeders' associations by means of milk courses, and in the second place by the setting of their laboratories at the disposal of milk tests.

When in the year 1899 a new building was erected for the State Agricultural Experimental Station at Hoorn, an experimental dairy farm was built in addition on the State's account. The free use of this building has been given by the State to the Association for Exploitation of an Experimental Dairy Farm at Hoorn. The State and the Province of North Holland each annually grant a subsidy, representing half the deficit on the exploitation of the farm, which deficit is naturally subject to a certain maximum. The Association exploits the industry under the direction of a manager whom they themselves appoint, with a view to the correct handling of the tests, which are chiefly made under the superintendence of the State Agricultural Experimental Station officials. Amongst other things this regulation does away with the accountancy complications attendant on the exploitation of a farm by the State itself.

A general members' meeting of the association is held annually, at which the plans of the experiments are discussed, as proposed by the Board, on the proposition of the Manager, in conjunction with the officials charged with the agricultural investigation work of the State Agricultural Testing Station at Hoorn.

The co-operation between the experimenters and the board and members of the Association has always been most admirable; in this way the State Agricultural Experimental Station at Hoorn is in a position to make practical experiments in addition to the researches of its laboratory; while it further ensures the necessary collaboration between practise and theory when new plans are required.

The farm is run on the main lines of a North Holland farm, and conducted in much the same way as the ordinary cheese farms of that province. The stable, however, which can hold 38 cows, has more resemblance to the farms in South Holland. There is an extensive dairy, so that cheese-making can take place in the usual farm manner.

The experiments at this farm not only relate to dairying: they further concern the feeding of cattle and pigs, while constant investigations are made into dairying and other machinery.

In order to make a successful stand against the adulteration in the butter trade, a Butter Law was enacted, this having been last amended in 1908 and put into force thus on 1st January, 1910. This law prescribes the total separation of margarine and butter preparation, and the State exercises direct control on both the making of and the trade in butter, margarine and other fats. It further determines the minimum fat content in the butter and the maximum butter fat content in the margarine, besides making stipulations respecting butter for import. The penalties inflicted for infringement of the stipulations, particularly when occurring designedly, are very heavy. In a few cases the infringement leads to imprisonment.

The law requires that margarine shall not contain over 10 per cent Reichert-Wollny. This under ordinary circumstances is equivalent to a butterfat-content of 10 to 25 per cent.

The universal board measure amongst other things determines that butter shall contain at least 80 per cent of butterfat.

The supervision of the observance of the stipulations of the Butter Act, besides being exercised by the ordinary police officer, is in the hands more particularly of an inspection service; this body is composed of an inspector, Chief of the Service, an adjunct inspector, 7 visitors of the 1st Class, and 16 visitors of the 2nd Class. Six of the last-named officers are practically charged with the extraordinary supervision of concerns where both margarine and butter are prepared that are intended for sale.

The State Dairy Station was founded for the purpose of undertaking:

(*a*) the chemical analysis of the butter samples which are taken pursuant to the Butter Act; and

(*b*) chemical analysis in the interests of the Netherlands dairy industry.

The State Dairy Station is entrusted with the issue of the State butter and cheese marks, and with part of the State supervision of the Butter and Cheese Control Stations. This supervision consists of:

1. A control of the apparatuses and chemicals used in the laboratories;
2. A control of the manner of execution of the prescribed methods for testing butter and cheese; and
3. A control of the results obtained from the butter cheese tests.

Combating the adulteration of butter and cheese by legal means has always shown itself to be a vexed problem. Consequently long before the present Butter Law was enacted, with its severe and striking measures, the genuine butter producers had been doing their utmost by combating fraudulent actions. To this end seven butter control stations were established. The members in association with these stations now pay almost the entire costs of the control themselves. This control consists in the paying of surprise visits by the controllers appointed for the purpose, when samples of the butter present, and frequently also of the cream are taken, as also of the butter they meet on the road. The presence of foreign fats is strictly forbidden, while the books must show an exact state of the production, as also of the eventual purchase and sale. Infringements are punishable by fine, and in serious offences by loss of membership. By virtue of his membership however, the producer is entitled to the use, with the obligations attached thereto, of a mark specially determined by the Act of 17th June, 1905, and manufactured and issued by the State; this mark at the same time serves as a means of at all times tracing the origin and period of manufacture of the wares. The difficulties occurring with the chemical tracing of adulteration are in this manner avoided. The control stations further guarantee the water content in the butter, i. e. a maximum of 16 per cent.

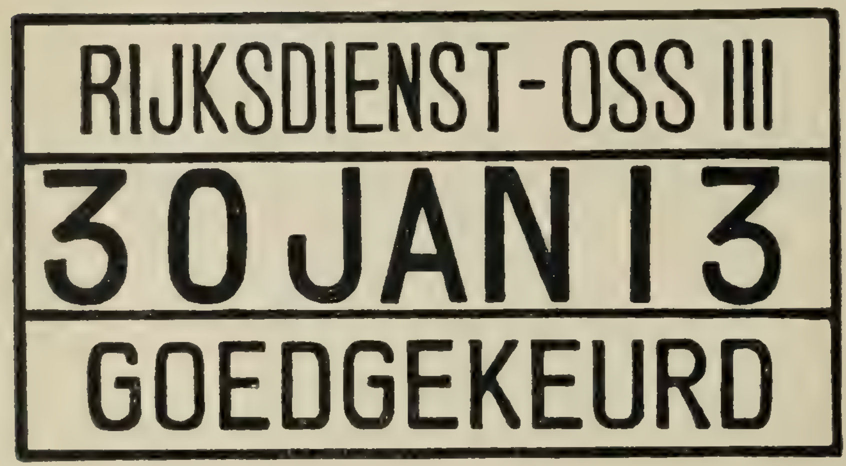
Supreme supervision is exercised by the State through the same officers who are specially commissioned with the supervision of and observance of the Butter Act, both as regards the analytical department and the actual control service of the associates.

Although earnest petitions are being made in various quarters for the regulation of the cheese trade by law, the State has so far taken no direct action. In imitation of the buttermakers a part of the producers have associated themselves with cheese control stations. (See p. 182). These efforts on behalf of cheese control are financially supported by the State. In the year 1911, indeed, a law was enacted whereby it is determined that, as in the case of the control of butter, the Minister of Agriculture, Industry and Trade shall issue State marks for the associates of a cheese control under the supervision of the State.

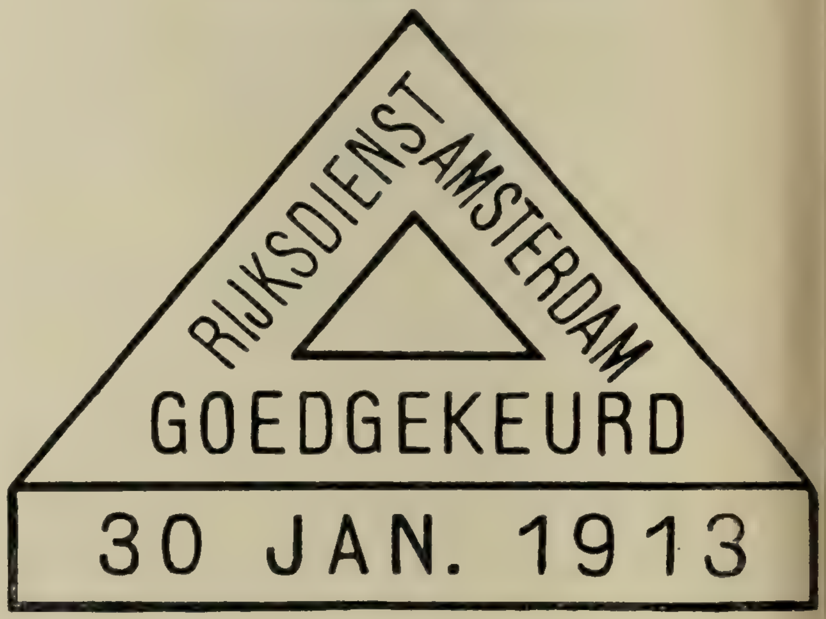
MARKS FOR MEAT

1. Unfit for export to the United Kingdom, but approved for consumption in The Netherlands:

Of pigs, sheep or cattle.

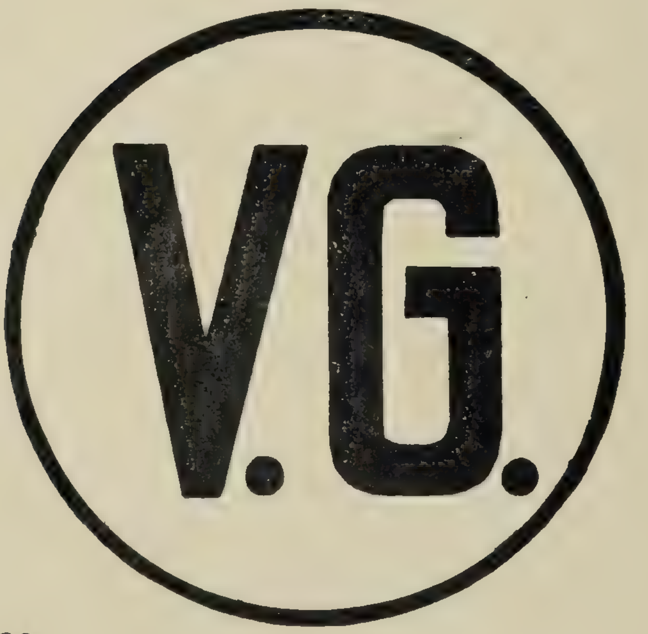


Of horses and goats.

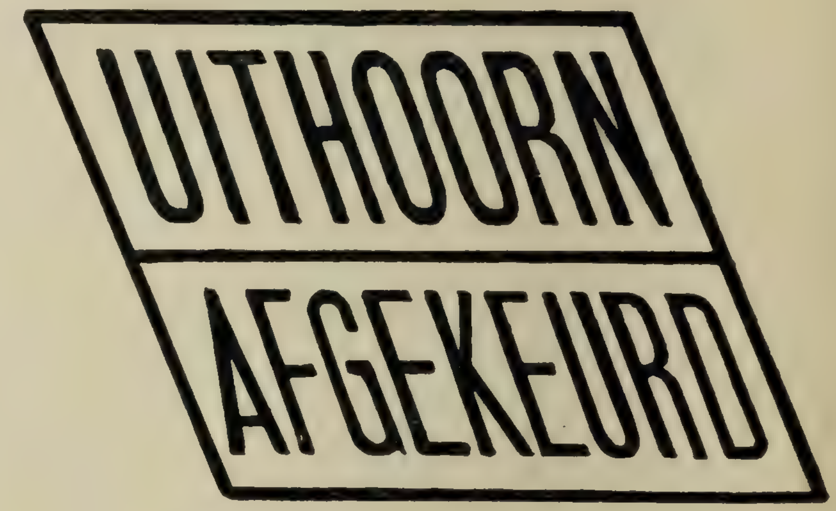


2. Unfit for export to the United Kingdom, but:

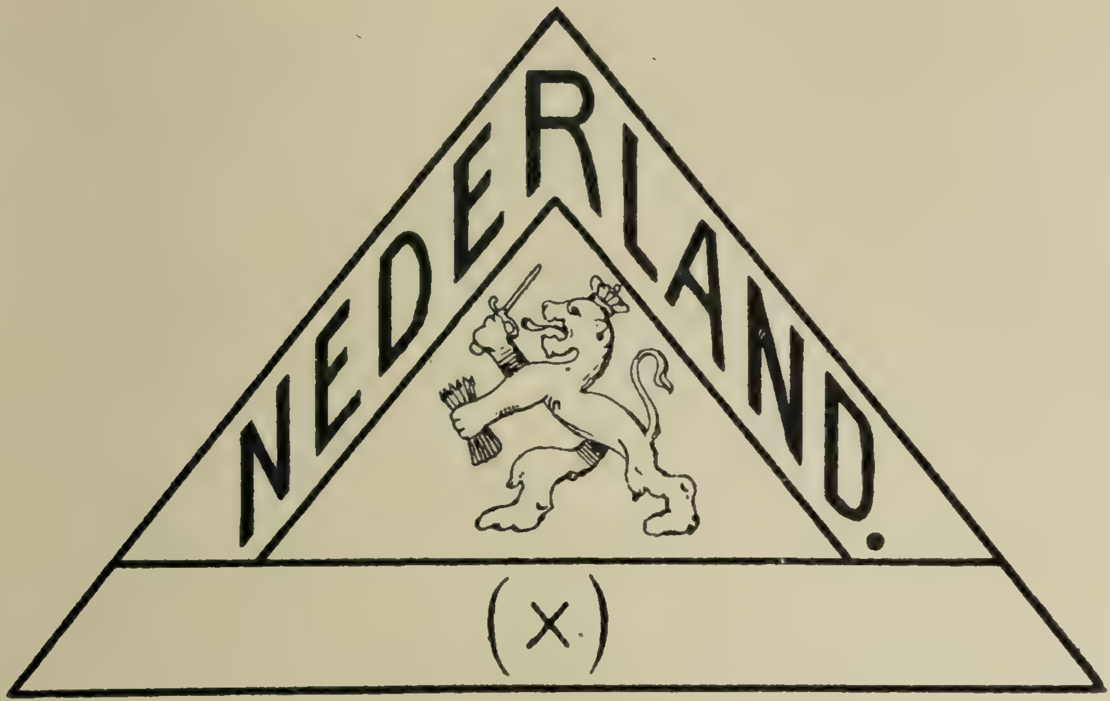
a) approved for consumption in The Netherlands on fixed conditions, as, for instance, boiled, melted, etc.:



b) also unfit for consumption in The Netherlands, but used before destruction:



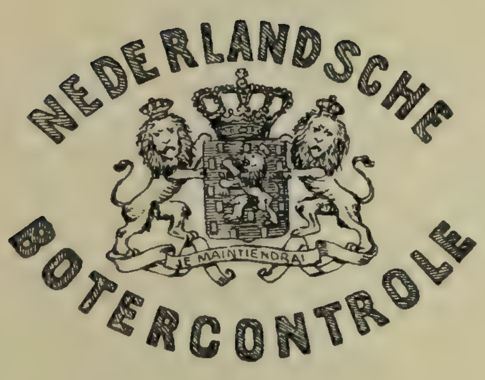
3. Destined for the United Kingdom, as so-called "bacon":

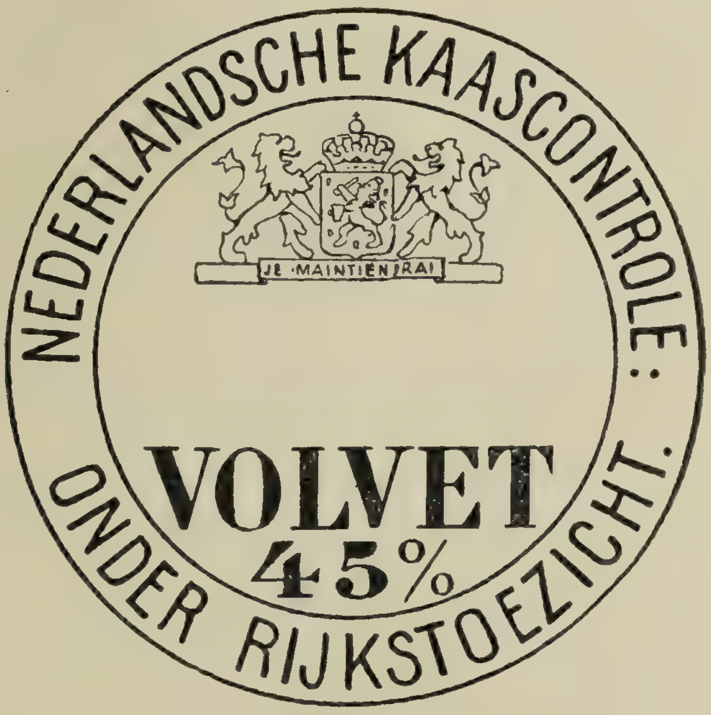


(×) Space for the name of the Control Station.

MARKS FOR

a) Butter [1]. *b*) Cheese [1].





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[1] Cf. on this subject the more extensive information on pp. 180—184.

THE ACTIVITY OF FARMERS' AND MARKET GARDENERS' ASSOCIATIONS IN THE NETHERLANDS.

The associative spirit of the Netherlands farmer and market gardener is very strongly developed, as may be seen from the following table of associations (or branches of national and provincial societies and associations).

YEAR.	Agricultural.		Horticultural.	
	Associations or Branches.	Number Members.	Associations or Branches.	Number Members.
1905......	1,088	100,328	219	20,965
1906......	1,184	109,885	227	22,876
1907......	1,225	117,184	223	23,050
1908......	1,277	123,281	226	23,873
1909......	1,314	129,166	235	24,892
1910......	1,341	134,815	245	26,862
1911......	1,376	142,235	246	27,285
1912......	1,407	147,708	267	29,463
1913......	1,436	156,473	294	34,078
1914......	1,467	160,599	314	36,543
1915......	1,495	168,589	322	39,441

Agricultural Associations. — If we divide the agricultural associations into the following groups:

a. National and provincial associations;
b. Credit associations;
c. Mutual insurance associations;
d. Associations relating to the rearing of breeding cattle;
e. Associations relating to the dairy industry;
f. Purchase, sale and production co-operative societies; and
g. Trade associations;

the following will apply to these various groups.

The national associations occupied in the more general sense with agriculture, are five in number, i. e.:

1. The Vereeniging *het Nederlandsch Landhuishoudkundig Congres* (Congress for Agricultural Economy) established in 1846 and, according to its Statutes, engaged in promoting farming interests by the holding of congresses;
2. The *Nederlandsch Landbouw-Comité* (Netherlands Agricultural Committee), established in 1884, and, according to the Statutes, having for object to act as Central Body for the promotion of agricultural, arboricultural and horticultural interests, in the broadest sense of the word. This Committee at present chiefly occupies itself with social-economic questions relating to agriculture;
3. The *Nederlandsche Heidemaatschappij* (Netherlands Heath Society) established in 1888, according to the Statutes, to promote the cultivation of waste lands, the preservation of woodlands and plantations, the instituting and keeping in order of irrigation and ground improvement works, and lastly the improvement of the fresh water fisheries;
4. The *Nederlandsche Boerenbond* (Netherlands Farmers' Association) established in 1895 for the purpose, according to the Statutes, of serving the interests of the farming class, and extending State assistance on behalf of that class. While all the other National Agricultural Associations here mentioned take up a neutral standpoint as regards religion, the Nederlandsche Boerenbond stipulates the recognition of Christianity, God and Family as the basis of society as a condition for membership;
5. The *Koninklijke Nederlandsche Landbouwvereeniging* (Royal Netherlands Agricultural Society) established in 1908, and having as object, according to the Statutes, the organisation of agricultural shows on an effective basis, and further the promotion of agricultural interests in general, in so far as they relate to the technical side of the industry.

In the Eleven Provinces of The Netherlands there are 31 agricultural associations of a provincial character. Most of them have joined one of the five above-mentioned National Agricultural Associations. They are usually subdivided into a number of branches, each having its own council, and working over one or more municipalities or districts. The joint total number of associates is 50,000, whose contributions amount to 71,000 guilders, while the subsidies granted by the State and other official bodies to these associations represent a total of 55,000 guilders. These associations are engaged in the promotion of the provincial agricultural interests in a general sense. Their methods vary to a certain extent, in accordance with the peculiar conditions of the agricultural industry in the separate provinces, and the origin of each association In general, however, one may say that the general meetings discuss the different subjects of actual interest for agriculture; that they invite agricultural speakers to appear at their meetings; that with the support of the authorities and their own resources they promote agricultural education and the improvement of the cattle; that by organising stable competitions they endeavour to improve the housing of the cattle; and by establishing inspections for growing crops further the production and use of true species and good seeds and tubers. In addition thereto the different agricultural societies take up special matters, such as opening up of nurseries for special crops, the issuing of a trade journal, holding agricultural shows, organisation of competitions for special kinds of machinery, the promotion of good milking by holding milk competitions and courses on milking, etc.

There are two matters of more modern origin which it may perhaps be advisable to consider more in detail at this juncture, i.e. the housing competitions and the inspection of growing crops.

The housing competitions are usually set on foot by the branches and thus concern small areas. In such an area papers are read by one or more agricultural experts (Government agricultural instructor, dairy expert, or agricultural engineer) on the practicability and necessity of improvement of the cowhouses, and the possibility of obtaining good pure milk without interfering with the proper method of preserving the manure.

At the end of the meeting anyone considering the improvement of his cowhouse, may offer himself as a competitor. Afterwards, at a previously announced date, he is visited by the Committee of judges, which is usually composed of a dairy instructor, an agricultural engineer, a veterinary surgeon, an agricultural instructor, and a practical stock farmer from another district. They discuss the different defects of the cowhouses entered for competition with the owners or occupiers, pointing out at the same time the simplest and cheapest way to overcome these defects. In about six months' time the said Committee pay a second visit to the cowhouses in question; upon this occasion they come unexpectedly, in order to make an inspection of the improvements made, the cleanliness of the stable and animals, and whatever may be of further local interest. Their judgment is based upon a scale of points, those gaining the highest number of points being awarded a prize in money.

Although comparatively few persons take part in these housing competitions, they are nevertheless highly useful institutions, since by these means good and practical cowhouses are everywhere erected and these are gradually imitated by a growing number of stock farmers.

As regards the inspection of growing crops, the knowledge is spreading amongst the farmers that, in order to obtain high yields from arable lands, it is not sufficient to use seeds or tubers which are satisfactory in appearance, but that it is above all essential to have the seed of a variety most suitable under the special circumstances, and which at the same time is obtained from fields which have not been contaminated by infectious diseases. In the case of the ordinary seeds and tubers sold in the open market, one is entirely ignorant as to their purity or the presence of germs of different plant diseases. Members of agricultural societies who have instituted an inspection, may have their fields inspected if desired. This being agreed to, a number of judges come to view the crops while growing, to testify:

1. The origin of the seed from which the crops are grown;
2. The purity of the species;
3. The absence of diseases;
4. The general condition.

If it appears that the crops come up to certain requirements, they are preliminarily certified. After harvest the seeds or tubers obtained from the certified growing crops are tested, and if up to standard are definitely certified. The different agricultural societies who occupy themselves with this matter then publish lists which usually give the names and addresses of the farmers whose crops are certified, as well as the names of the different varieties, quantity of seed or tubers available and the price at which it is to be sold. The organisation of these inspections varies slightly in the different provinces; however, the above outline practically conveys the general system prevailing.

H. M. the Queen visiting the Frisian Agricultural Exhibition in 1912 at Leeuwarden.

The publication of the addresses where certified seeds and tubers are obtainable is not only to the interest of the producers themselves, but benefits the farmers at large, forasmuch as they appreciate the use of acclimatised true species of seeds and tubers which are free from disease.

The number of local co-operative Farmers' Loan Banks in The Netherlands towards the end of 1913 amounted to 821; they have over 73,000 members, a total capital in deposits of over 43 million Guilders, and a total of 19 million Guilders in outstanding loans. They are affiliated to one of the three central banks, established at Utrecht, Eyndhoven and Alkmaar.

The co-operative agricultural credit system in The Netherlands is still in its early stages. During the agricultural crisis towards the close of the last century, when The Netherlands suffered heavily, many unsuccessful attempts were made to organise an agricultural credit system similar to that which existed in Germany and Italy. In 1898, however, the Boerenbond (Farmers' Association) at last succeeded in paving the way for a satisfactory organisation, the Coöperatieve Centrale Boerenleenbank at Eyndhoven (Central Bank at Eyndhoven) being its nucleus. This organisation was principally intended for the benefit of the Roman Catholic population in the southern part of the country. Subsequently

Friesian milch cattle in the meadow.

another organisation was founded a year afterwards upon a neutral basis, with a Coöperatieve Centrale Raffeisenbank (Central Bank) at Utrecht as headquarter, which operates in the other provinces and is of a strictly neutral character. After that a third organisation on a small scale was established at Alkmaar, which is also under Roman Catholic influence.

The organisation of the co-operative agricultural credit system in The Netherlands greatly resembles the German system of organisation; in fact, in its main lines it may be considered as a copy.

The loan banks have a local character with a somewhat limited sphere of action; the administration is conducted gratuitously, only the cashier receiving a gratification or yearly fee. Credit is extended for short periods, and is intended to serve as working capital for the members, and not as mortgage credit.

The members of the local banks are unlimitedly liable for the liabilities of their bank. The local banks are affiliated to the Central Banks; the former are liable for the debts of the latter, to a limited extent however.

The State, unlike in Germany and France, put no money at the disposition of the Central Banks; their capital consists of the deposits of the affiliated local banks, but the Netherlands Bank at Amsterdam has consented to if necessary give credit up to a limited amount. The State puts only a relatively small sum annually at the disposition of the Central Banks, in order to meet the expenses of the inspection of the local banks, and also pays the costs of inspection of the Central Banks by an accountant appointed by the Government.

In order to meet the demand for mortgage credit, the Central Bank at Eyndhoven founded in 1908 the Co-operative Farmers' Mortgage Bank; this Bank lends money to its members at the rate of $4^1/_2$ per cent.

The Central Bank at Utrecht has already for a long time been considering the establishment of a co-operative mortgage bank, but has not yet succeeded in realising this plan.

Meanwhile there was affiliated to this central Bank during 1913 a large "Dairy Bank" in the province of Friesland, which is intended to act as a bank for the affiliated cooperative dairies.

Turning to the subject of fire insurance, hailstorm insurance, agricultural accidents insurance, and cattle insurance, the number of locally working fire insurance societies on the 31st December, 1912, amounted to no less than 188, with over 102,000 insured members, and an insured capital of 334½ million Guilders. The receipts over the financial year 1911/1912 amounted to about fl. 581,000, while the expenditure came to fl. 385,000. Notwithstanding the local character of these insurance associations, and the big amount of the insured joint capital, re-insurances seldom occur, although there are signs at hand to show that the advantage of re-insurance is beginning to be realised.

In 1912 there were in existence 10 mutual hailstorm insurance associations counting almost 12,000 members, and insuring crops to the extent of wellnigh 130,000 H.A., representing a value of over 24½ million Guilders.

Seeing that agriculture in The Netherlands is an industry which does not fall under the Compulsory Accident Insurance Act, while a large number of farmers are nevertheless convinced of the desirability of insuring their labourers against the financial consequences of accidents which they incur during the performance of their duties, there have been established no less than five mutual agricultural accident insurance societies since the year 1909. By far the most important of these is the "Centrale Landbouw-Onderlinge" (Central Agricultural Mutual Society) of Amsterdam.

In 1912 the total membership amounted to 15,000, and the insured yearly wages to almost 18 million Guilders, 14 millions of which were insured with the Central Agricultural Mutual Society.

In 1911/1912 the number of mutual associations for the insurance of horses was 523, with 48,549 members and 90,602 insured animals, representing a total value of over

26 million Guilders. For the mutual associations for the insurance of cattle the figures were as follows: 885 associations, 89,748 members, and 377,340 animals insured, the latter being over 51 million Guilders in value.

Passing on to the subject of stock holding associations, we must naturally make a distinction between the different varieties of animals. We will first take the associations relating to cattle-breeding, these being of most importance; moreover, these will be discussed more in detail than the other associations relating to the improvement of cattle.

In the first place there are four cattle herd-books in existence, i. e.

1. *Nederlandsch Rundveestamboek* (*Netherlands Cattle Herd-book*), established in 1873, and completely reorganised in 1906. It works over the whole of The Netherlands, with the exception of Friesland, and comprises three books, one for each breed found in The Netherlands (black and white, red and white, and the Groninger white heads);

2. *Friesche Rundveestamboek* (*Friesian Cattle Herd-book*), established in 1879, and exclusively intended for the black and white cattle in the province of Friesland;

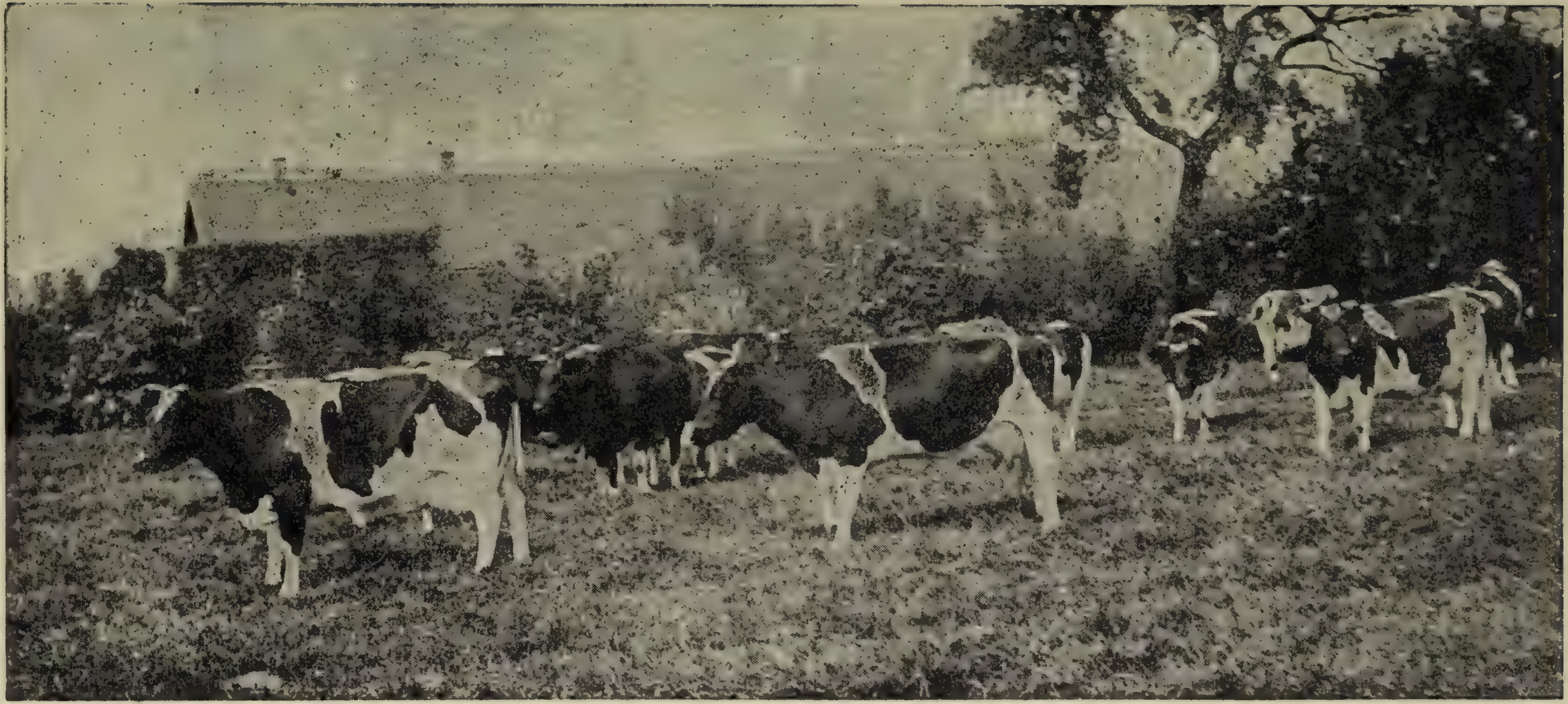
3. *Rundveestamboek "Noord-Holland"* (*North Holland Cattle Herd-book*), established in 1883, exclusively working in a small part of North Holland; and

4. *Groninger Rundveestamboek* (*Groningen Cattle Herd-book*), established in 1908, and exclusively intended for white head Groningen cattle.

For the sake of clearness we would here remark that the herd-books under 3 and 4 also include animals of the same breeds as are inscribed in two of the par. 1 herd-books. The regrettable discord in this matter is the consequence of the different views on certain points held by a number of persons; it is, however, hoped that these differences of opinion will be adjusted sooner or later.

The Netherlands and the Friesian Cattle Herd-book receive a considerable subsidy from the Government; the other two herd-books do not receive such subsidy.

The arrangement of our Netherlands cattle herd-books



Black and white pedigrees in South Holland.

is somewhat different to that observed by many foreign herd-books; in a certain sense our organisation gives a better guarantee that the pedigrees contained in the herd-book are absolutely correct. With several foreign herd-books, which however more frequently concern large breeders, the statements of the breeders are accepted without being controlled, unless they are proved to be incorrect. With us, on the contrary, a strict control is exercised on the notifications of the birth of calves.

A second point of difference to several foreign herd-books is, that not all the animals descended from cattle herd-book parents are entitled to be entered, but that each animal, irrespective of its number of inscribed parents and ancestry, must be first submitted to exterior examination in accordance with a scale of points; and only those animals are entered which obtain or exceed a minimum number of points.

With the Netherlands Cattle Herd-book the course of procedure, in brief, is as follows. In the administration two books are distinguished, i. e. the "Register", in which only approved animals are entered concerning whose descent however nothing positive is known; in the second book, which is called the "Herd-book", only such animals are entered whose descent from herd-book parents or "Register" parents can be indicated with certainty. The proof of such descent must be given in the following manner.

The holder of a herd-book bull must keep a serving list, and supply to the owner of the cow a certificate of mating. The said owner, immediately he is assured of the gestation of his cow, but in any case within six months after the last mating, must give notification thereof to the Chief Bureau of the Netherlands Cattle Herd-book.

When the calf is born the owner is bound to notify the herd-book thereof within seventy-two hours of the event, together with particulars relating to the colour and special characteristics, as also a rough sketch of the animal which must clearly indicate the distribution of the black and white or red and white over the body. This declaration of birth and sketch is subjected to the control of the Netherlands Cattle

Black and white pedigrees in Friesland

Herd-book. These young animals, whose descent from herd-book parents (herd-book or register) can be positively determined, are entered in a Register for young cattle, and after passing inspection, may be entered in the herd-book when they have delivered for the first time.

With the Friesian Cattle Herd-book the *modus operandi* are similar to those above described, except that the "Register" is called "Auxiliary Herd-book", and that no sketches are made of the newly-born calves.

The Groningen Cattle Herd-book is also conducted in much the same way.

With the North Holland Cattle Herd-book no young cattle register is kept, nor is there any splitting of the herd-book into an actual herd-book and a register (auxiliary herd-book). Here the descent is based upon the declarations of the cattle-breeding societies (see hereunder).

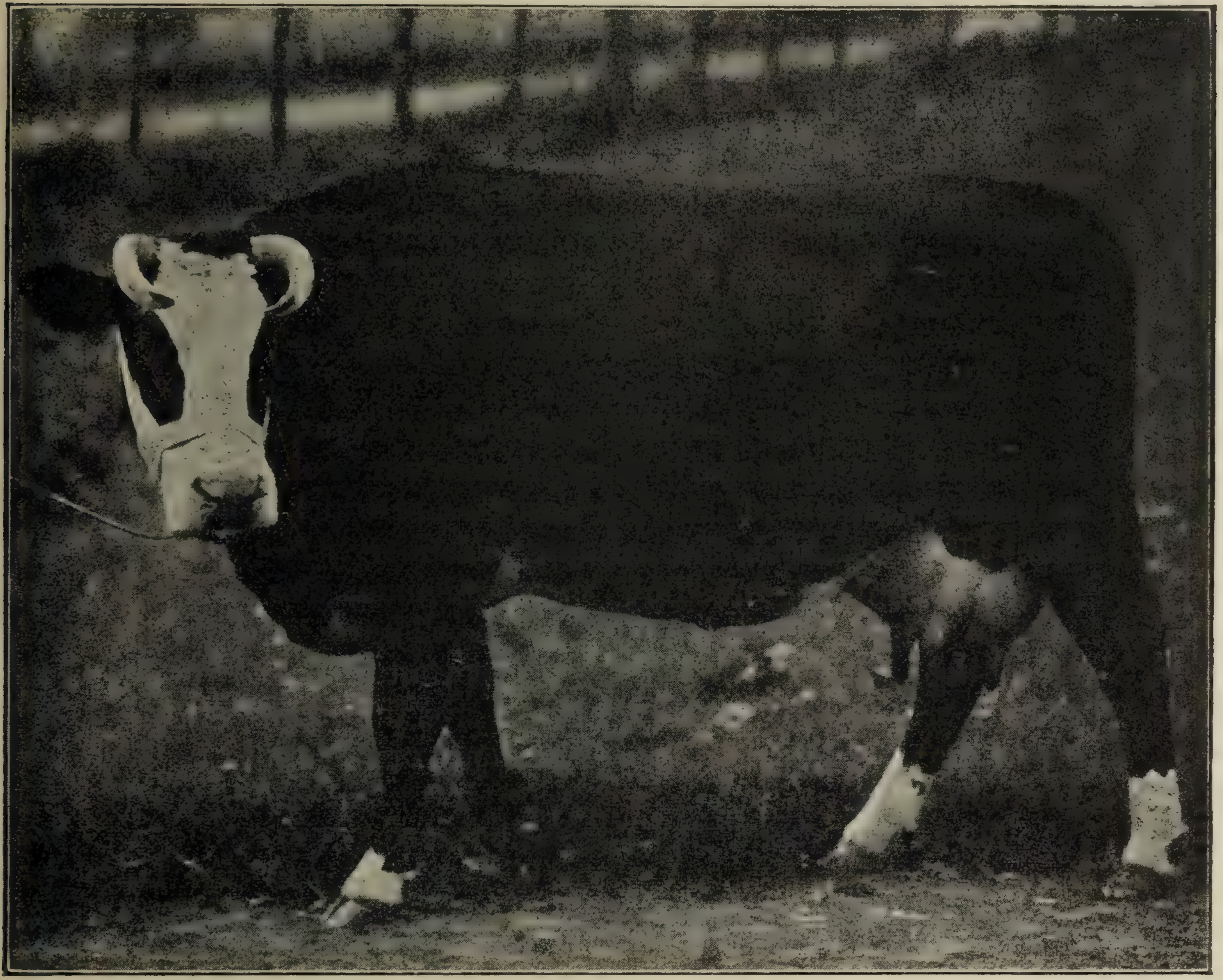
As the farms in The Netherlands are mostly of a very limited size, the improvement of the stock is sought after on the whole by means of co-operation, by establishing bull societies, control societies and breeding societies.

The bull societies are associations of breeders who, for joint account, acquire good male breeding material for their stock. In this way the members are in a position to use better bulls than would be the case if each one kept a bull of his own, while it further frequently results in keeping prime bulls for improvement of the stock at home and thus preventing them being sold abroad. There are about 300 bull societies, which are spread all over the country.

Control societies are associations of cattle holders, who appoint a mutual inspector charged with the determination, at regular intervals, of the milk yields, the fat content of the milk, and the butter yields of the cows belonging to the members.

From this data the annual yielding power of the different animals can be determined with great accuracy. There are about 140 milk control societies in all, and about 57,000 animals are tested.

Breeding societies are practically amalgamations of bull societies and control societies; moreover, the breeding societies keep records of the descent of the different animals. Consequently one could describe a breeding society as a locally working herd-book, which at the same time occupies itself with supplying good male breeding material, and testing the milk and butter yields of the members' cows. There are about 140 breeders' associations, representing about 20,000 cows.



Black-and-white headed Groningen cattle type.

The expenses of the bull societies, control societies, and breeding societies are for the greater part borne by the members themselves. In order to promote the establishment of these institutions, several Provincial Regulation Commissions support them financially during the first years of their existence.

In the provinces of North Holland, South Holland and North Brabant most of the cattle-breeding societies have combined into three associations, one for each province.

In respect to horse-breeding, there is for the draught horse type one stud-book for the whole country, called: "Stamboek voor het Nederlandsch trekpaard" (Belgian type). Besides that one there are different stud-books for the agricultural carriage type. One, called Stud-book of the "Nationale Vereeniging tot bevordering der Paardenfokkerij in Nederland", works over the greater part of the country. Others: the Groningen, the Friesian, the Drenth and the Gelderland horse-studbook are working only for the pureness of that name.

Just as the bull societies work for the improvement of their stock, so the horse breeders endeavour to obtain good stallions by means of stallion societies, of which there are about 112 in existence throughout the country.

As regards pig-breeding, there are about five associations in existence which are run more or less on the lines of a herd-book, but they are so far unimportant.

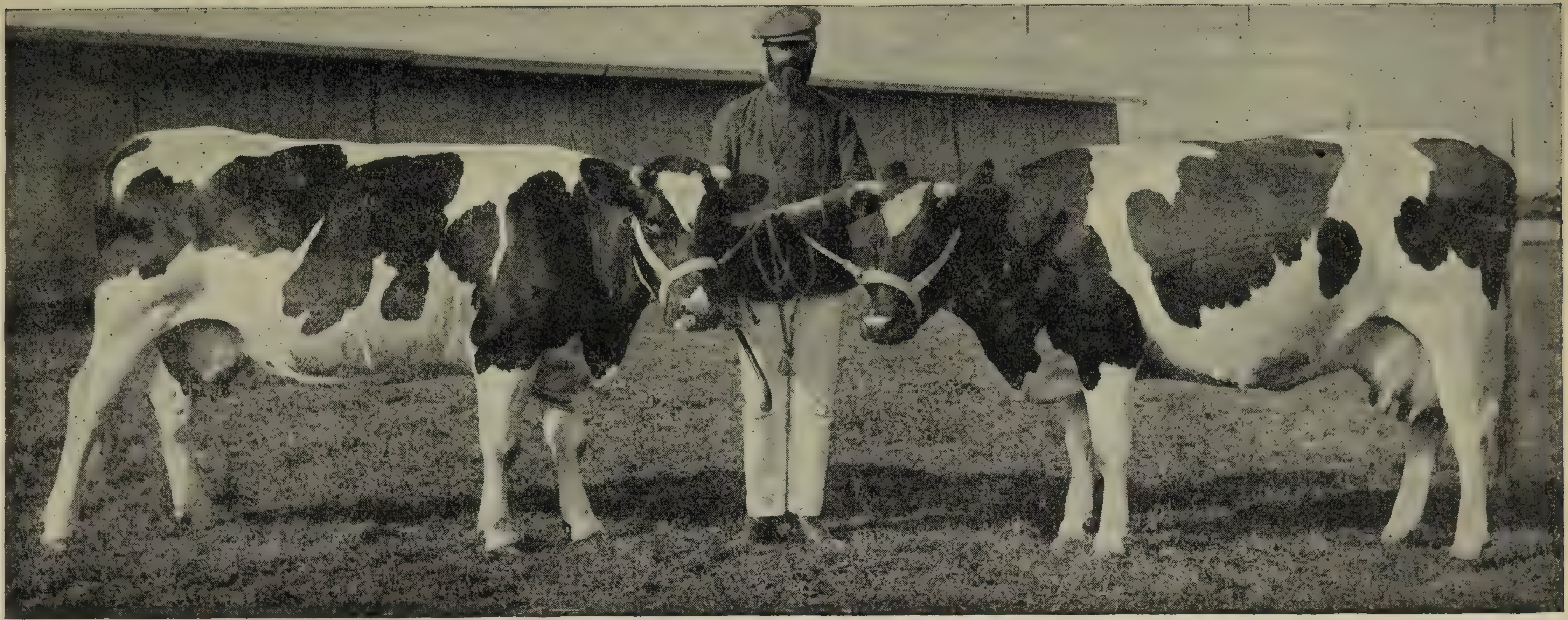
In corresponding manner there are four associations which more or less fulfil the conditions of a flock-book for sheep-breeding.

There are about 200 associations occupied with the improvement of the goat, a matter of growing importance. In general they confine themselves to the supply of good male, and occasionally also female breeding material. In a few cases they undertake the testing of milk yields as well. Different associations have amalgamated into some six federations of big breeders.

In respect to utility poultry and rabbit breeding, we have the "Vereeniging tot bevordering van de Pluimveehouderij en tamme Konijnenteelt in Nederland".

This association was established in 1901, and has almost 20,000 members.

The interests of apiarists are looked after by the „Vereeniging tot bevordering der bijenteelt in Nederland"; it



Two Friesian cows at the Agricultural Exhibition at The Hague in 1913.

was established in 1897 and represents about 5,500 members.

The majority of the dairy associations have already been enumerated in the chapter on Dairy Produce in The Netherlands. Meanwhile, the following may be added, inasmuch as it concerns the associations of dairy farmers.

The "Algemeene Nederlandsche Zuivelbond", which was established in 1900, consists at present of seven associated units. These seven provincial associations represent in all 430 co-operative dairies. The yearly total quantity of milk made into butter and cheese by these 430 dairies amounts to almost 1,000 million K.G.

The contribution paid by the different co-operative dairies towards their provincial association, amounts, on an average, to 5 cents per 100 K.G. of milk handled.

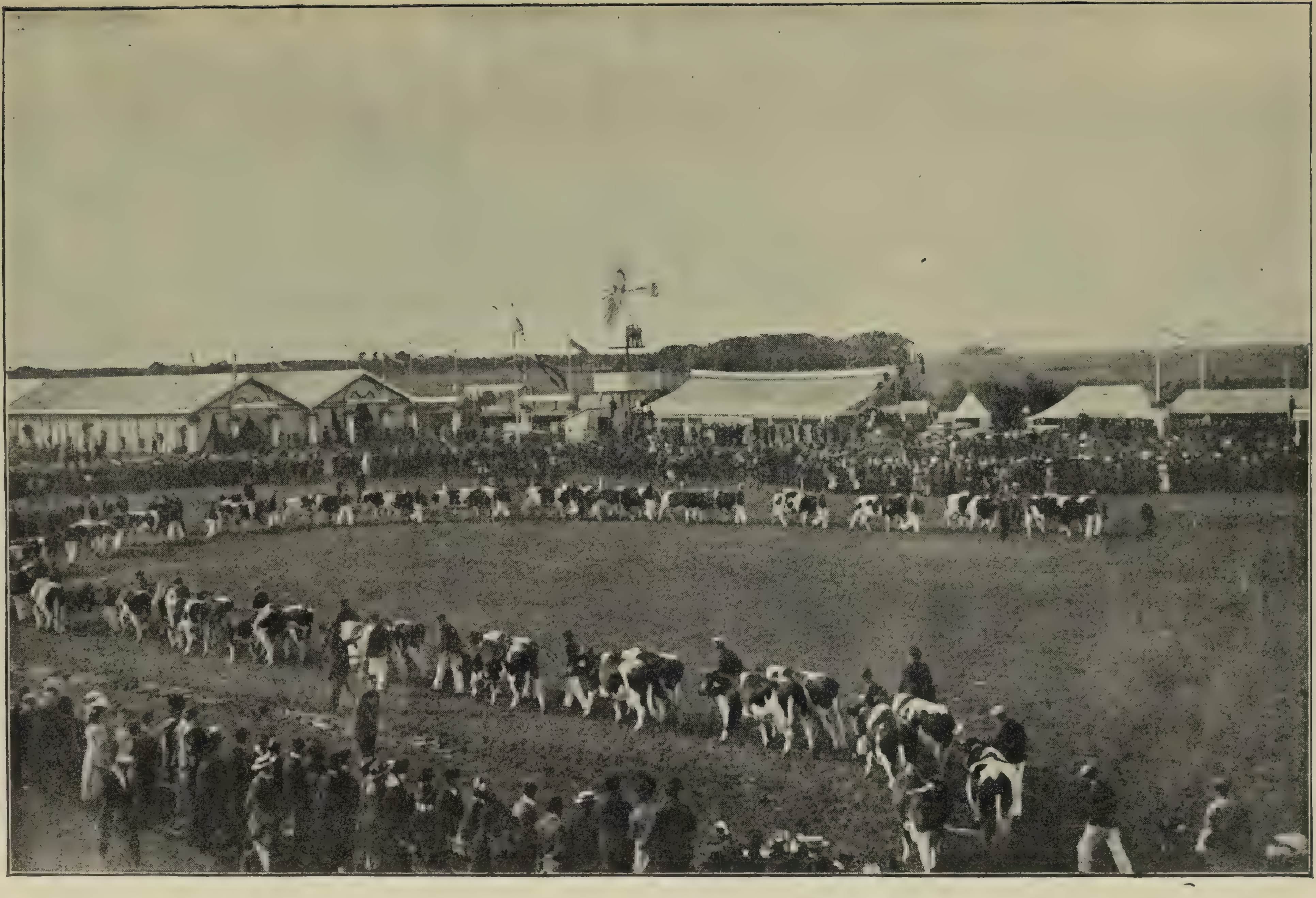
As said elsewhere already, these different associations promote the improvement of the quality in various ways, they purchase different requirements for joint account, and further promote the general interests of the Netherlands dairy industry, and more particularly those of the co-operative dairy industry.

The "Friesche Coöperatieve Zuivelexportvereeniging" of Leeuwarden, was established in 1898, and now 33 co-operative dairies are associated to it; these dairies are bound to entrust the sale of all their butter and Cheddar and Cheshire cheese to the Dairy Export Association. The yearly turnover of butter and cheese amounts to almost $6^1/_2$ million Guilders. The association contributes considerably to the improvement of the quality, by enforcing regular inspections and strict payment of the butter and cheese delivered in accordance with quality.

The Coöperatieve Zuivelexportvereeniging "De Swanneblom" was established in 1909, and acts in a similar manner. There are nine associates in all.

In North and South Holland, where the milk in the neighbourhood of the big cities is largely bought up by the dairy companies, there is a separate federation of milk cowkeepers for each province, in order to defend the interests of their associates whereever necessary.

In order to guarantee the purity of their butter the



A parade of cattle at the Frisian Agricultural Exhibition in 1912.]

genuine butter producers have established so-called "Butter Control Stations" consecutively at Leeuwarden (1901), The Hague (first at Leyden in 1901), Deventer (1903), Assen (1903), Groningen (1904), Eyndhoven (1904), Maastricht (1904) and Middelburg (1904). The last mentioned station was done away with in 1913, and its associates transferred to the one at Eyndhoven.

The associated butter makers bind themselves to have nothing to do, either directly or indirectly, with the manufacture or the sale of margarine, and only to manufacture butter which satisfies the Butter Act and moreover does not contain over 16 per cent moisture. The associated creameries and dairies are inspected at regular intervals by the Officers of the Control Stations, as well as by the State Supervisors of the Butter Control Stations, who are entitled to take samples of the butter and cream and of any other substance found on the premises. The so-called "Government Mark" must be placed on all butter, this consisting of the Netherlands Coat of Arms encircled with the words: Nederlandsche Botercontrôle onder Rijkstoezicht (Netherlands Butter Control under Government Supervision) and further certain letters and figures. This mark is printed on extremely thin perforated paper and placed on the butter in such a manner that it cannot be removed intact, and it cannot thus be illegally used for a second time. The letters and figures on the Government Mark are of such a nature that the Butter Control Stations are always able to trace the origin and time of manufacture of each parcel of butter. Moreover, the butter samples from all the dairies being examined at regular intervals, the chemical composition of the butter manufactured during those periods is known exactly. Adulteration is threatened with heavy fines and loss of membership; we may add that there is a clean record at present. The presence of excessive moisture, as also infringement of other stipulations concerning the administration, makes the dairy liable to heavy fines.

The total quantity of butter manufactured under control, amounts to about 120 million lbs. per annum. At the commencement the Government lent financial support to the Control Stations; at present they are self-supporting and

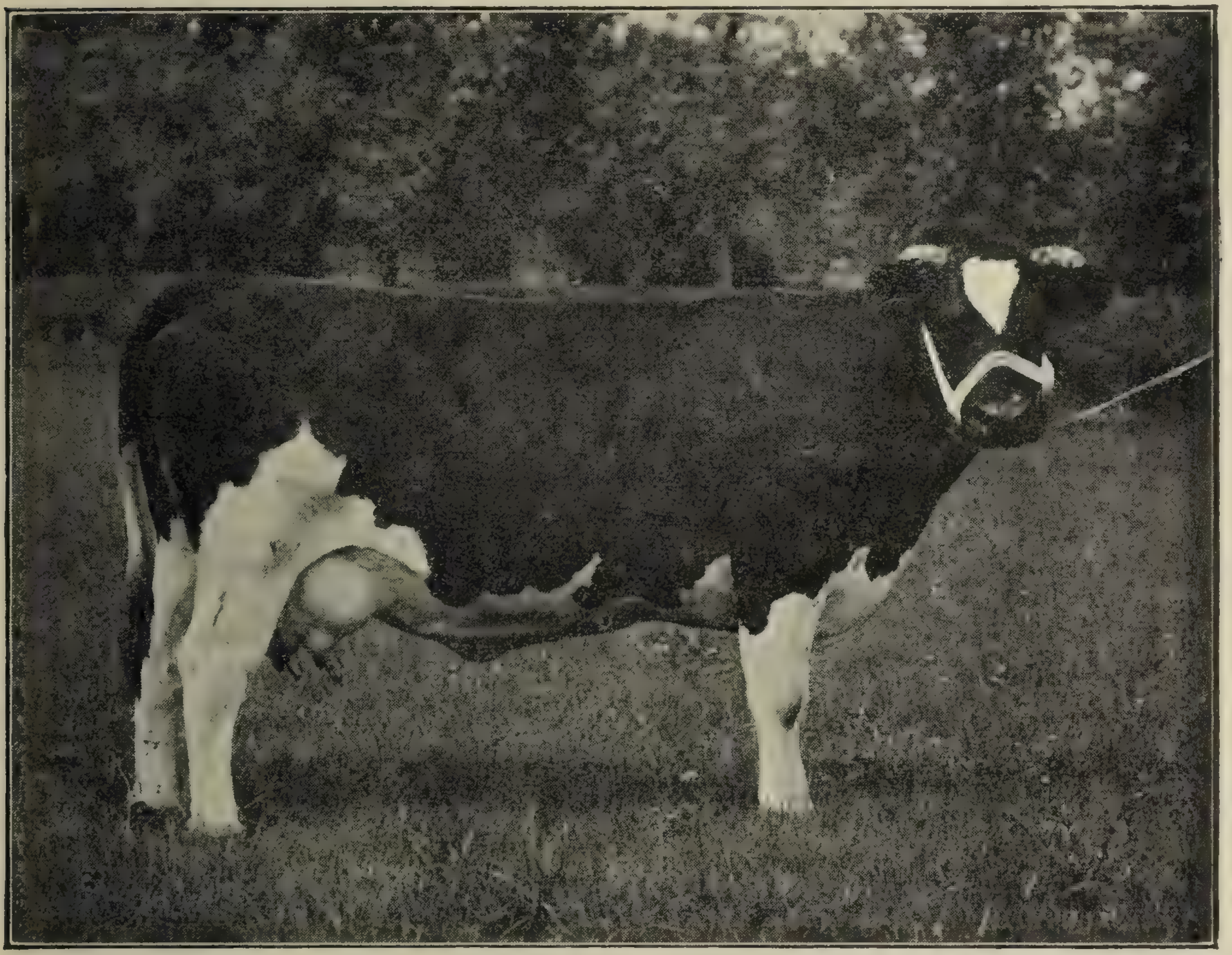
Friesian cattle at the Agricultural Exhibition at The Hague in 1913.

the members pay at the rate of fl. 0.20 or less per 100 K.G. butter produced.

In view of the fact that genuine Gouda cheese has always been made of whole milk, but that cheese manufactured of partially skimmed milk in the same shape is now also put on the market, cheese control stations have been established both at The Hague (1907) and at Utrecht (1914) for the protection of the genuine whole milk article. The associated cheese manufacturers may only make cheese of the whole milk, and in such a manner that the fat content in the dry substance is not below 45 per cent, while the water content may not be excessive. The associates contribute at the rate of fl. 0.75 per cow; further, the Government and the province both lend substantial financial support. Of late the Government has introduced a separate Cheese Act and in consequence thereof established a Government Mark for the cheese manufactured from whole milk and not containing less than 45 per cent of butterfat in the dry substance. The Control Stations both at The Hague and at Utrecht are entitled to make use of this mark. The mark again is manufactured in such a way that it cannot be removed intact, while it also indicates the origin and manufacture period of the cheese.

In order to protect the interests of the cheese which is not entitled to use the Government Mark, and to prevent all unmarked cheese from being treated alike, the "Algemeene Nederlandsche Zuivelbond", the "Vereeniging van Zuivelfabrikanten in Nederland", and the "Bond van Coöperatieve Zuivelfabrieken in Friesland" have jointly established a cheese control station at Leeuwarden. This station issues trade marks for full cream and for half-cream Cheddar and Cheshire cheese and for other cheeses with a fat content of 45, 40, 30 and 20 per cent of fat respectively in the dry substance.

In a country like The Netherlands, where, compared with a large number of other European States, the small and medium sized holdings are greatly in preponderance, and where the rural population have been accustomed for centuries to stand by each other locally, in working together for the attainment of mutual local interests, the agricultural co-operative system has been firmly established and has already given considerable support in many ways to the individual farmer in the practice of his industry. This we have already seen with the mutual farmers' loan banks, the insurance system, the improvement of the stock, and the factorial preparation of dairy produce; and we shall see it hereafter as well, in the joint purchase and sale of products required for the agricultural industry or in the disposal of its products, and the manipulation for joint account of the produce of the land.



Red-speckled Meuse-Rhine-Yssel cattle type.

Through this co-operation of many small men, the Netherlands agricultural industry, with its greater intensity as compared with the extensive farming elsewhere, is quite able to hold its own as regards the purchase of its raw materials, and the sale and manipulation of its produce, and to share to some extent in the advantages which occupiers of large farms otherwise have.

Most of the mutual associations concern the purchase of manures, feeding stuffs and seeds; of these associations there are almost 1,200 in existence. In this connection we must remark that the link which binds the different persons in a locality working jointly for this object, is frequently of a very fragile character, and in default of legally recognised statutes, merely rests upon the moral feeling of responsibility of the respective associates. This is above all the case with the smaller associations, which have a very limited sphere of action; the associations working over a larger area usually adopt some or other form of legal association.

Every year there is generally bought about 17 million guilders' worth of manures, 19 of feeding stuffs, and over half a million guilders' worth of seeds and other articles through co-operative means. Nearly 105,000 farmers and market gardeners participate in this co-operative purchase, while the average amount bought per 100 H.A. arable and meadow lands and market gardens over the whole of The Netherlands is nearly fl. 1,700.

Two central associations working throughout the whole country assist the local mutual purchase associations in their operations.

There is in the first place "Het Centraal Bureau uit het Nederlandsch Landbouwcomité voor het aanschaffen van landbouwbenoodigdheden voor geheel Nederland" (its abbreviation being "Central Bureau") established in the year 1900. This Central Bureau endeavours to bring the producer and the consumer together, by entering into contracts and making deliveries under its own name. Moreover this Central Bureau endeavours to promote the science of agriculture by organising lectures, and laying out experimental fields, and further to improve the intellectual development of the rural population by giving advice. The majority of the local purchase associations take advantage of the assistance of the Central Bureau.

In the second place comes "De Vereeniging van koopers van kunstmest, veevoeder en zaaizaden onder Algemeene Handelsvoorwaarden" (known as "Association of Buyers under A. H. V.") which was established in the year 1909. The object of this Association is to act, in conjunction with:

a. The Association of Manufacturers of and Dealers in Artificial Manures, Feeding Stuffs and Seeds; *b.* The College of Directors of the Government Agricultural Testing Stations, and *c.* Other interested parties; and to fix:

- *a.* The forms for purchase by contract, and the conditions for purchase either privately or by tender;
- *b.* The stipulations in regard to sampling;
- *c.* The standards for feeding stuffs, artificial manures, and seeds;
- *d.* The settlement of disputes by means of arbitration, and
- *e.* All matters which may arise therefrom or relate thereto.

Trading, and buying or selling for members is expressly forbidden.

Many of the above-mentioned local purchase associations are members of this organization, and by this means reasonable relations between buyers and sellers are furthered, and costly and lengthy adjustment of disputes is avoided.

Amongst the more locally working purchase associations a peculiar place is taken by the so-called "Handelsvereenigingen" (*Trading Associations*), about fifteen of which exist in the country. The joint total number of members amounts to almost 4,000; the total amount of their purchases surpasses three million Guilders, while their yearly balances amount to over 40,000 Guilders. These Trading Associations are characterized by the fact that a considerable portion of their balances is not divided amongst the members (frequently the Statutes forbid this altogether) but is used for the general benefit, such as improvement of the stock, agricultural libraries, education, agricultural excursions, protection of birds, etc. If these balances were divided amongst the members, each member would only receive a relatively small sum, which practically speaking would not make him better off, and the money would at the same time be completely lost for the development of the agricultural industry. As a matter of fact the general spirit prevailing amongst the rural population of The Netherlands renders it very difficult, if not impossible to persuade them to contribute anything like substantial amounts directly, for the sake of their common agricultural interests. The co-operative trading associations, as a matter of fact, withhold a considerable portion of their balances from their members, who are nevertheless entitled to same; and in this way the latter with full consent contribute not inconsiderably towards the promotion of their common interests, with the result that in a roundabout way objects are realised which would not be attained at all, or only after a great amount of trouble, if directly striven after.

Red-speckled Meuse-Rhine-Yssel cattle type.

The first principle of the co-operative purchase system is that no credit is given; this is contrary to the custom of the village storekeeper, who does so repeatedly, but occasionally takes the opportunity to deliver inferior articles at high prices, or, at any rate in former years, to lay the foundation for a forced (on the part of the farmer) exchange business. For many persons the ready money system is an obstacle which prevents them from profiting from the advantages of the joint purchase system, unless there is a farmers' loan bank in his district which considers them good enough for an advance for the purchase of manures and feeding stuffs or other articles. Frequently, indeed, the development of the agricultural credit and the co-operative purchasing go hand in hand.

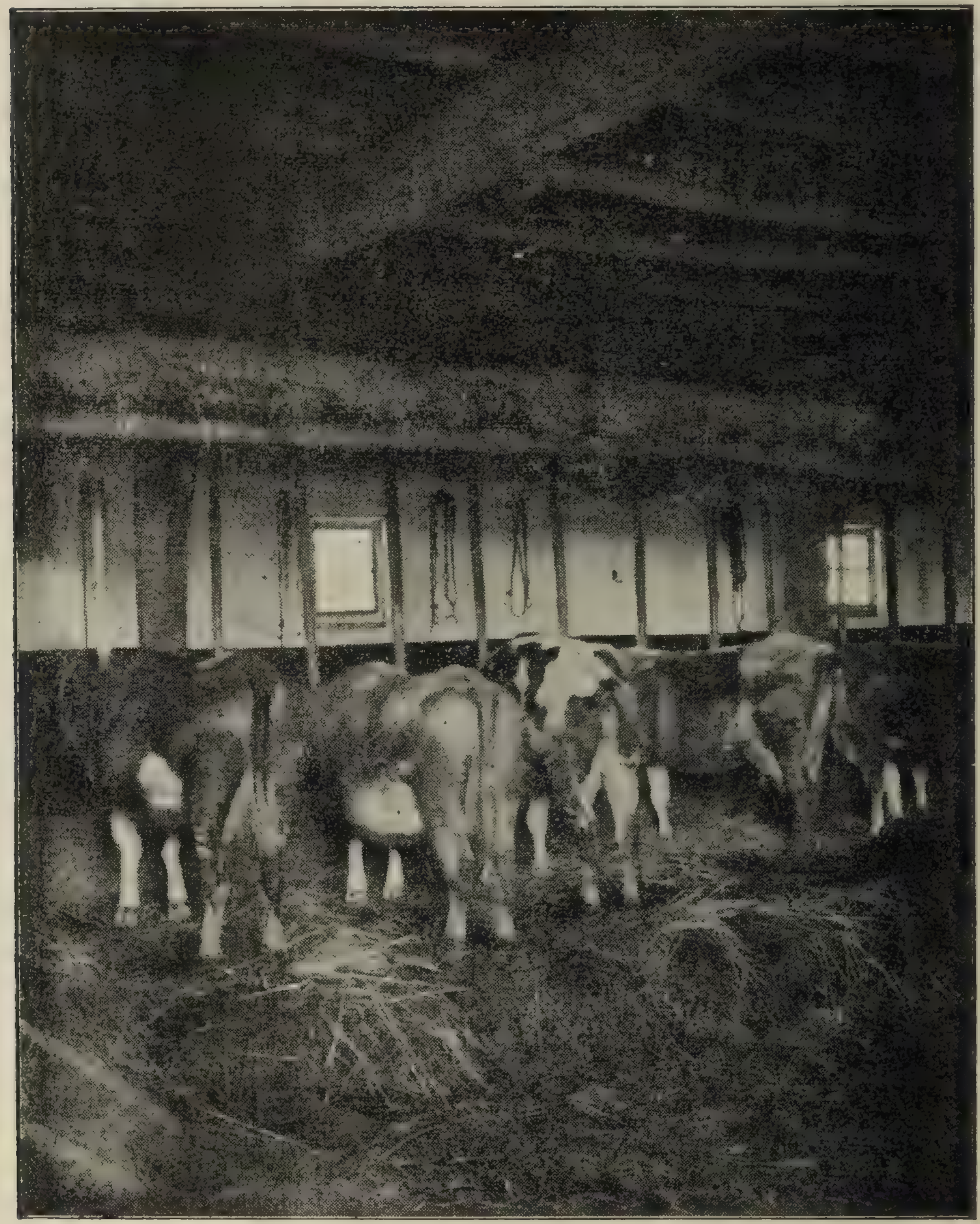
A second obstacle in the way of participation in co-operative purchase in its simplest form in lieu of buying at the village store, is that in the former case the total requirements for a certain period must be ordered all at once, while at the store one can buy from hand to mouth. In order to meet the situation many co-operative purchase associations set up a store where the members are permitted to keep their surplus stocks for the time being and fetch them away as required. This first extension of the co-operative purchase in its simplest form frequently leads to another, which is less innocent, i.e. to the buying by the association of different articles at a moment when prices are apparently low, although the associates may not yet have given any orders. This lends a speculative character to the purchase, and may give rise to losses, especially when the buyer is not a good business man. In the case of the bigger concerns, such as the Central Bureau and the trading associations, it is less dangerous to proceed to such a step, provided it be entrusted to experienced persons.

A number of the purchase and trading associations also run an establishment for the grinding of different feeding stuffs.

There are, besides, a large number of co-operative milling societies whose chief business is the grinding of feeding stuffs, but who also frequently conduct the purchase of the raw materials. Some of these mills are connected with co-operative dairies, which does away with the necessity of a separate engine for driving the mill.

There are about 60 of these co-operative milling societies, with 4,200 members and a turnover of over three million Guilders.

In 1909 the majority of the milling societies in South Holland established the Federation of Co-operative Milling Societies for South Holland and Utrecht.



Old-fashioned cow-house in North Brabant.

The co-operative milling societies not only have the advantage that they can operate for considerably less charges than the ordinary millers, but moreover, with the co-operative societies, there is no admixture with less desirable feeding stuffs of others, as may be the case either by accident or on purpose with the private mills.

With the exception of those cases already mentioned (dairy export associations and butter auctions) the co-operative sale of agricultural products is relatively only little developped as yet. Chief in importance are the co-operative associations for the sale of eggs, of which there are seven throughout the country. In some cases the associations conduct egg auctions, and thus hold public sales of the eggs brought to the auction; sometimes they dispose in the usual business way of the eggs sent by their members. They have about 6,000 members with a yearly sale of 40 million eggs. This co-operative selling has not only considerably raised the price in many districts, but has brought about many other important advantages as well. By regularly controlling the quality and age of the eggs delivered (by egg testers, etc.) and the stamping of the eggs, the circulation of eggs of bad quality is prevented and the good name of the product improved or maintained.

Through the difference which most of the associations make in the price for large and small eggs, and the higher prices on the whole which are obtainable for the sorted and stamped eggs, the co-operative selling has a considerable influence on the improvement of the poultry stock and the care of poultry in country districts.

Further, there are several associations in existence, about twenty in all, which conduct the sale of the honey of their members. In some cases they are branches of the Association for the Promotion of Apiculture in The Netherlands, and in other instances they are separate associations.

Of late years the production co-operative system is increasing in importance. In addition to the important growth of the co-operative dairy industry which we have already discussed in a previous chapter, there are the co-operative sugar factories, the potato flour, strawboard, and feeding cake factories, as also the export slaughterhouses. In regard to these industries we may append the following information.

The first co-operative sugar factory was established at Sas van Gent in the year 1899, the second one not until the year 1909, which was however soon followed by others after 1911. That the progress in the establishment of these and other co-operative enterprises still to be discussed in this chapter, is so slow, is due to the fact that these factories require a very large capital, and that there is a considerable risk attached to such enterprises in consequence of the competition of the financially powerful private concerns. This renders the organization of these big co-operative concerns a matter of the highest importance, and the compulsory supply of the raw materials by the members requires to be properly determined in the Statutes. The faulty regulations in this respect of the earlier co-operative enterprises caused their failure. Amongst others this was the case with a co-operative export slaughterhouse, the members of which were not bound to deliver either a certain number, or all of their stock to the association; the consequence was that competing firms bought up the choice animals at top prices, with the result, amongst other things, that the co-operative slaughterhouse received exclusively animals of inferior quality, and moreover far too few animals in proportion to the working capacity of the factory which had been built.

The co-operative sugar factories have consequently adopted the following principle.

The capital for building the factory is acquired by issuing shares. On pain of confiscation of the shares, a certain quantity of sugar beet per share has to be delivered to the factory by each shareholder, a measure whereby the thus organized co-operative sugar factory is always assured of a minimum quantity of raw material to work with.

The co-operative potato flour and strawboard factories have been organized in a corresponding manner.

The number of co-operative sugar factories in existence are four in all. The two oldest, which are those established at Sas van Gent and Dinteloord, comprise 1,000 members, the quantity of beet handled amounting on an average to 125 million K.G. per annum, and the turnover in cash to 4 million Guilders a year.

There are nine co-operative and 13 other strawboard factories with a yearly turnover of almost 317 million K.G. of straw.

The number of co-operative potato flour factories exclusively established in Groningen, Drenthe and Overyssel is twenty in all; they can handle nearly 9 million H.L. potatoes. Without the co-operative factories there are 17 other potato flour factories with a turnover of about $5^1/_2$ million H.L. potatoes.

A field of garden beans at Roelofarendsveen.

There are four co-operative export slaughterhouses altogether, one in North Brabant and three in Drenthe.

Finally we must mention the "vakvereenigingen", to which, amongst others, belong the associations of old pupils of different educational institutions, of managers of co-operative dairies, etc. Of the first mentioned there are no less than 36. These different associations make themselves highly useful in keeping up what has once been learned by organising lectures and meetings, as well as by supplying literature, and making all sorts of experiments relating to agriculture, cattle feeding, etc.

There are three associations of managers of co-operative dairies.

Lastly we must not forget to mention the "Nederlandsche Vereeniging van Land- en Tuinbouwonderwijzers" (Netherlands Association of agricultural and horticultural teachers).

Horticultural Associations. — We can divide the horticultural associations into the following groups:

a. National Associations whose working sphere extends over the whole country, or at any rate over the greater part thereof;

b. Local associations.

These local associations in their turn can be subdivided into:

1. Associations for the establishment and exploitation of experimental market gardens;
2. Co-operative Auction Associations;
3. Co-operative Forwarding Associations;
4. General Trading Associations.

The following may be noted regarding these respective groups.

There are ten of the national horticultural associations in all, i. e.

1. "*Nederlandsche Tuinbouwraad*" *(Netherlands Horticultural Federation)*, a federation of Netherlands Horticultural Associations established in 1908, and having as object the promotion and well-being of Netherlands horticulture, more especially by looking after the social and economical interests of the horticulturists, the improvement of trade customs, and extension of markets. On the 1st January, 1915, this Federation comprised 119 associations with a joint total of over 26,000 members.

Since 1st January 1913, it has issued a weekly Journal entitled "Tuinbouw" (Gardening).

2. "*Nederlandsche Maatschappij voor Tuinbouw en Plantkunde*" *(Netherlands Horticultural and Botanical Society)*, established in 1872, having about 3,100 members distributed over 40 branches. This Society has for object the promotion of horticulture in general by extending and increasing the knowledge of the industry. A special branch of this Society is the instruction of the elements of gardening. They at present issue a monthly paper.
3. "*Algemeene Vereeniging voor Bloembollencultuur*" *(General Association for Bulb Culture)*, established in 1861, for promoting the cultivation of bulbs in the widest sense of the word. They have three thousand members divided over 37 branches. They issue a bi-weekly entitled "Weekblad voor Bloembollencultuur."
4. "*Hollandsch Bloembollenkweekersgenootschap (Netherlands Bulb Growers' Association)*, more especially for furthering the interests of the *bulb growers*. There are over 1,400 members divided over 31 branches. They issue a weekly entitled "Kweekersblad" (The Nurseryman).
5. "*Bond van Bloembollenhandelaren*" *(Federation of Bulb Merchants)*, for the special purpose of furthering the interests of *bulb merchants*. There are about 200 members.
6. "*Nederlandsche Tuinbouwhandelsvereeniging*" *(Netherlands Horticultural Trading Association)*, for the purpose of furthering the trade in nursery and florists' requirements. They issue a weekly entitled "De Plantenbeurs" (The Plant Exchange). They have about 80 members.
7. "*Nederlandsche Pomologische Vereeniging*" *(Netherlands Pomological Association)*, established in 1898, for the purpose of furthering the culture of and the trade in fruit. They have about 1,000 members. They issue a "Monthly".

8. "*Nederlandsche Chrysanthenclub*" (*Netherlands Chrysanthemum Club*).
9. "*Nederlandsche Orchidophilenclub*" (*Netherlands Orchidophilist Club*).
10. "*Nos Jungunt Rosae*".

The three last-named associations principally consist of amateurs, their aim being respectively the cultivation and knowledge of chrysanthemums, orchids and roses.

The Associations for the establishment and exploitation of experimental market gardens, thirteen in all, are established in different parts of The Netherlands, and their object is, to encourage market gardening, to extend the knowledge of plant culture, and to make experiments with regard to the best species and varieties, manuring, pruning, methods of culture, etc., by establishing and exploiting experimental gardens in different neighborhoods.

The *co-operative auction associations* occupy themselves with the sale by auction of the products of the members to the trade, all costs incurred by such sale being for joint account of the members.

These associations principally concern the sale of vegetables and fruit; they have revolutionised the trade in these products, and have been largely instrumental in the prevention of abuses.

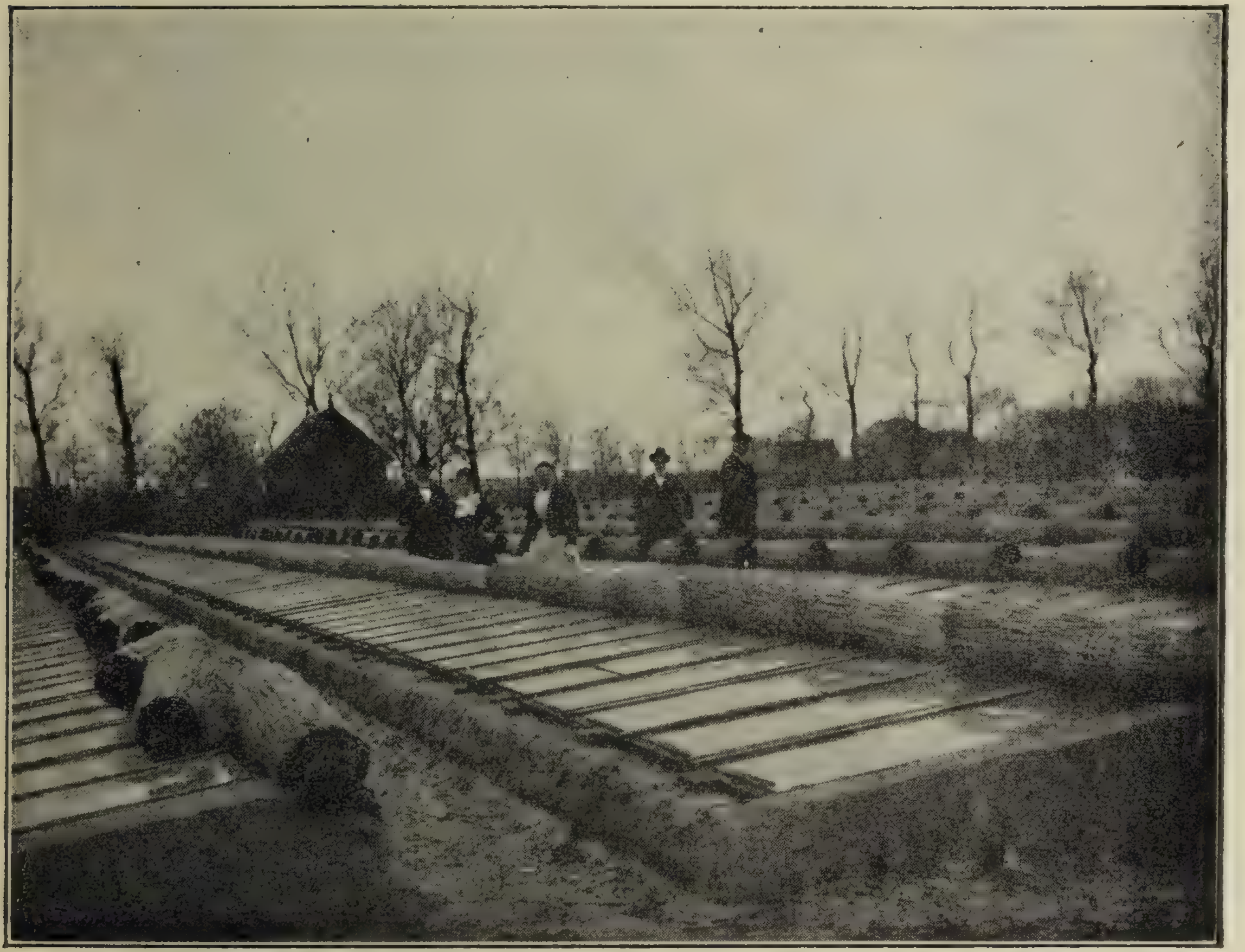
The first auction market was established in 1887; there are now about 100 in existence with a turn-over of about 20 million guilders.

Only professionals (chiefly market gardeners and fruit-growers) can be members of these societies. These members elect out of their midst a Council, consisting usually of a president, a vice-president, a secretary and two or four more members. On a favourably situated piece of land, bought by the Council in the name of the society, an auction building is erected, and in this building the Council, which is assisted by one or more officials, appointed and paid by the Council, holds the auctions.

The selling is done in the manner of what is called

"Netherlands auctions," and by means of an automatic auction apparatus, consisting of a big dial with a pointer. Round the rim of the dial figures are placed, indicating the prices.

On raised seats, opposite this apparatus, the merchants are seated. Every seat has a number and communicates electrically with the dial by means of a button. Between these seats and the apparatus is a small canal, wide enough for a barge to be poled through.



Rows in the Westland.

Every morning the growers gather the produce, ready for market, in their gardens, grade it, weigh it and write the quantity down in a book. The produce is then put into a barge and one of the workmen poles it to the auction-place, where he hands the book to the office. From the moment the auction starts the barges are poled through the small canal between the merchants' seats and the auction apparatus. The auctioneer announces the quantity and releases the pointer, starting at a figure on the rim of the dial which indicates a price that is too high. The pointer swings round, indicating lower and lower prices. When the price some merchant is prepared to give, is reached, the buyer presses his button. The pointer stops, indicating the price at which the produce is sold, and at the same time a number appears, indicating the seat of the merchant who bought it. As the

A greenhouse for peaches and grapes at Poeldyk.

merchants have always the same seats, these numbers indicate the merchants themselves.

The amount for which the produce is sold, is entered in the book above mentioned, and when the barge is poled out, this book is flung on the barge. When the workman returns home with the empty barge, the grower can see in this book what price his produce has fetched.

Before the merchants can receive the produce they bought, they must pay at the office.

Once a week the grower can fetch his money from the office, less a certain percentage which is retained by the Council to pay the expenses.

We append some particulars concerning the "Loosduinen" auction society.

This Society was established in 1900 by 46 members; the first auction was held on April 10, 1900.

The first year's turnover amounted to 238,000 guilders. In 1901 the society already counted 133 members, and the turnover was then 275,000 guilders, thus only a slight increase. This was because many members sold a big part of their produce directly to the exporters and not through the auction.

In 1902 a resolution was passed by which the members were obliged to sell all their produce by means of the auction.

Some members did not like to bind themselves as to the way in which they should try to dispose of their products and separated themselves from the society. The society went on with 116 members, and the balance of 1902 shows a turnover of 456,000 guilders.

Gradually the number of members increased to 210. In 1906 the new premises were bought and the auction building and packing-sheds erected. The cost was 81,000 guilders, of which sum 35,000 guilders was put up by the members (debenture loan), and the remainder raised on mortgage.

Every year a part of this money was reimbursed (in 1907 21,000 guilders, in 1908 8,500, in 1909 5,500, in 1910 4,500, in 1911 1,200, and in 1912 20,000 guilders), whilst the premises were also improved every year and new packing sheds built. The total cost now amounts to 114,000 guilders, of which sum 61,000 guilders have been paid off.

The yearly turnover is still increasing every year and was:

in 1903	436,000	guilders.
„ 1904	563,000	„
„ 1905	705,000	„
„ 1906	837,000	„
„ 1907	1,054,000	„
„ 1908	1,065,000	„
„ 1909	1,408,000	„
„ 1910	1,562,000	„
„ 1911	1,830,000	„
„ 1912	1,895,000	„
„ 1913	1,830,000	„

The co-operative forwarding associations undertake to send their members' produce, again principally vegetables and fruit, abroad direct, either in consignment or to regular buyers ad previously agreed prices. The members (market gardeners) send in a daily statement to the Council of the Association of what produce they have ready for shipment and what quantity. The market gardeners pack their produce themselves in boxes prescribed and bought by the association, and marked with the number of the grower and the mark of the association; they further, in accordance with the instructions of the Council, bring their produce to the railway station or boat, and a few days afterwards receive the amount which the produce has realized, less a small percentage towards meeting the costs. These associations, of which there are five in all established in The Netherlands, thus do away with the middleman to a certain extent.

We must finally include in this section the associations which endeavour to promote horticulture locally. In each district most attention is given to such branches of gardening as are of the greatest local importance. For instance, in a district where nurseries are prevalent, and other branches of culture are of little or no significance, a local horticultural association will specially endeavour to promote the interests of the nurserymen. It is evident that the association will then consist of nurserymen only. In other parts, however, where no particular branch of gardening dominates, but where in addition to fruit, vegetables are also grown, and some attention is paid to flower culture and arboriculture, the local associations are extremely mixed in composition, and their efforts are extended towards the furtherance of horticulture in general. These local associations frequently include amateurs amongst their members.

A grape-growing greenhouse at Naaldwyk.

RECLAMATION OF HEATHS IN THE NETHERLANDS.

The report on Agriculture in The Netherlands concerning the year 1914 records that in that year there were 507,233 H.A. of waste land, that is to say about one-sixth of the whole area of the country.

These waste lands are classed as follows:

Untrenched high fen	33,636	H.A.
Trenched high fen (i. e. soil from which the peat has been removed but which is not yet brought into cultivation)	23,021	„
Heaths	398,399	„
Moving sandhills	14,971	„
Dunes (sandhills near the coast)	37,206	„

The waste lands are very unequally distributed throughout the country. Heaths are met with almost exclusively in the provinces forming the southern and eastern frontiers, the dunes in North Holland, South Holland, Zeeland and Friesland, the trenched peatlands in Drenthe, Friesland and Groningen, North Brabant and Limburg. The following table gives a more explicit idea of affairs (for the year 1914):

	H.A. Untrenched high fen	H.A. Trenched high fen, not yet brought into cultivation.	H.A. Heaths.	H.A. Moving sand-hills.	H.A. Dunes.	H.A. Total.
Groningen	3,736	558	11,621	--	—	15,915
Friesland	525	2,576	16,049	706	2,294	22,150
Drenthe	20,474	5,714	86,741	3,733	--	116,662
Overyssel	5,849	7,037	74,676	28	—	87,531
Gelderland	—	152	79,924	8,627	14	88,717
Utrecht	3	6	6,370	15	22	6,416
North Holland	1	25	2,185	34	24,794	27,039
South Holland	5	—	987	—	7,223	8,215
Zeeland	—	—	—	—	2,849	2,849
North Brabant	1,822	3,682	96,920	1,672	10	104,106
Limburg	1,221	3,271	22,985	156	—	27,633
The Netherlands	33,636	23,021	398,399	14,971	37,206	507,233

Comparing the waste lands proportionately with the area of the provinces, the results are as follows:

Groningen	6.74	per	cent	of	waste	land.
Friesland	6.68	„	„	„	„	„
Drenthe	43.98	„	„	„	„	„
Overyssel	26.31	„	„	„	„	„
Gelderland	17.94	„	„	„	„	„
Utrecht	4.63	„	„	„	„	„
North Holland......	9.80	„	„	„	„	„
South Holland	2.72	„	„	„	„	„
Zeeland	1.60	„	„	„	„	„
North Brabant......	21.35	„	„	„	„	„
Limburg	12.54	„	„	„	„	„
The Netherlands..	15.55	per	cent	of	waste	land.

Drenthe with its 44.45 per cent by far exceeds all the other provinces, and only the five provinces of Drenthe, Overyssel, Gelderland, North Brabant and Limburg have more than 10 per cent of waste lands.

Prior to being brought into cultivation the high peatlands in this country are trenched and the peat is conveyed to all parts of the country as fuel. The many waterways serve as an easy and cheap means of transport, and thus one can easily comprehend that in a country like this, where there is but very little coal to be found, peat fetches a reasonable price and a ready market. Before peatlands are brought into cultivation a considerable capital is realised in fuel.

In developing the trenched peatlands it is of the highest importance that, in removing the peat, the interests of the future tiller of the soil be considered. If this is neglected, a soil that is totally unfit for development is left, while on the contrary one has a soil which, though poor in vegetable food and therefore requiring plenty of manure, is still, from a scientific aspect, in good condition and capable of yielding a very good percentage of produce. To obtain such good arable lands the upper layer, the litter, must be left and so prevent the transposition of peatlands into sandy soil. The provinces of Drenthe and Groningen have adopted regulations and provisions respecting the trenching of peatlands, whereby the obligation is imposed upon the peat-diggers that a certain portion of the light peat soil shall be left, that is to say the upper portion thereof. (In Groningen at least 40 c.M., in Drenthe at least 50 c.M.).

In Germany, where there is plenty of coal, the high peatlands are brought into cultivation without removing the peat.

The draining is executed with very great care, because too great removal of moisture would be highly injurious to the peat soil, seeing that great dryness of the upper layer and the consequent loss of power of suction would cause the crops to suffer from drought, and the soil is then treated with artificial manure and generally becomes arable land. To prevent the danger of drought it is not laid down as pasture land. Lately, however, the use of heavy rollers has been advocated, so that the upper layer remains moist and the cultivation of grass becomes practicable.

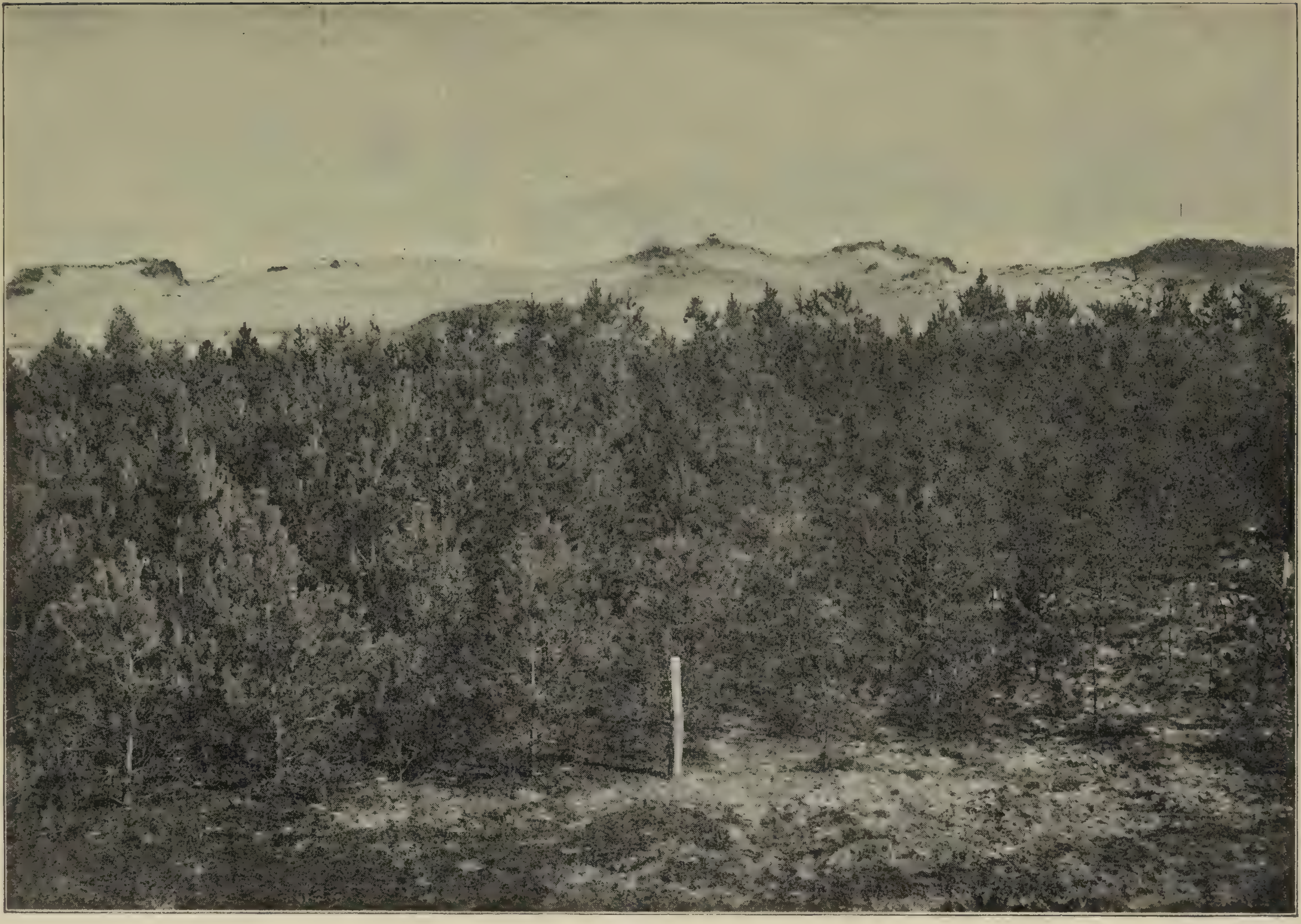
In The Netherlands, as has been said, the peat is first removed. First one or two main canals and the necessary tributary ditches are cut, in order to drain the ground; then the peat is removed and the manures and crops supplied and removed.

The litter of peat soil that is left, is distributed all over the field, and in so doing great care is taken that the surface of the sandy subsoil is covered to a depth of at least 50 c.M. The whole extent is then covered with at least 10 c.M. of sand obtained from the canals and ditches, and then this sand is mixed with about 5 c.M. of the thick layer of peat soil.

As the trenched lands are poor, they must have plenty of manure, but there follows a crop of potatoes of about 500 H.L. fit for the factory, of which a portion may sometimes be sold for consumption.

Potatoes constitute the principal crop in the "Groningen and Drenth fens"; also a great deal of rye and oats is grown; while, moreover, the fen colony district is well adapted for horticultural products. The intensive farming on carefully treated lands, where neat farms and a flourishing population is met with, proves that prosperous farming may be realised from what was formerly a barren and unfertile fen.

There are no low fens or bog-fens mentioned in the Agricultural Report of The Netherlands in its summary of



Plantation on the moving sandhills at Kootwyk.

waste lands. And yet there are some very extensive low-lying fens and bog-fens, which, by reason of insufficient drainage and not enough manuring, yield such a poor crop of grass that they may justly be classed among the waste lands.

Better drainage and the use of artificial manure (acid phosphate and potash) and sand would not alone result in larger crops, but would tend to an improved crop also.

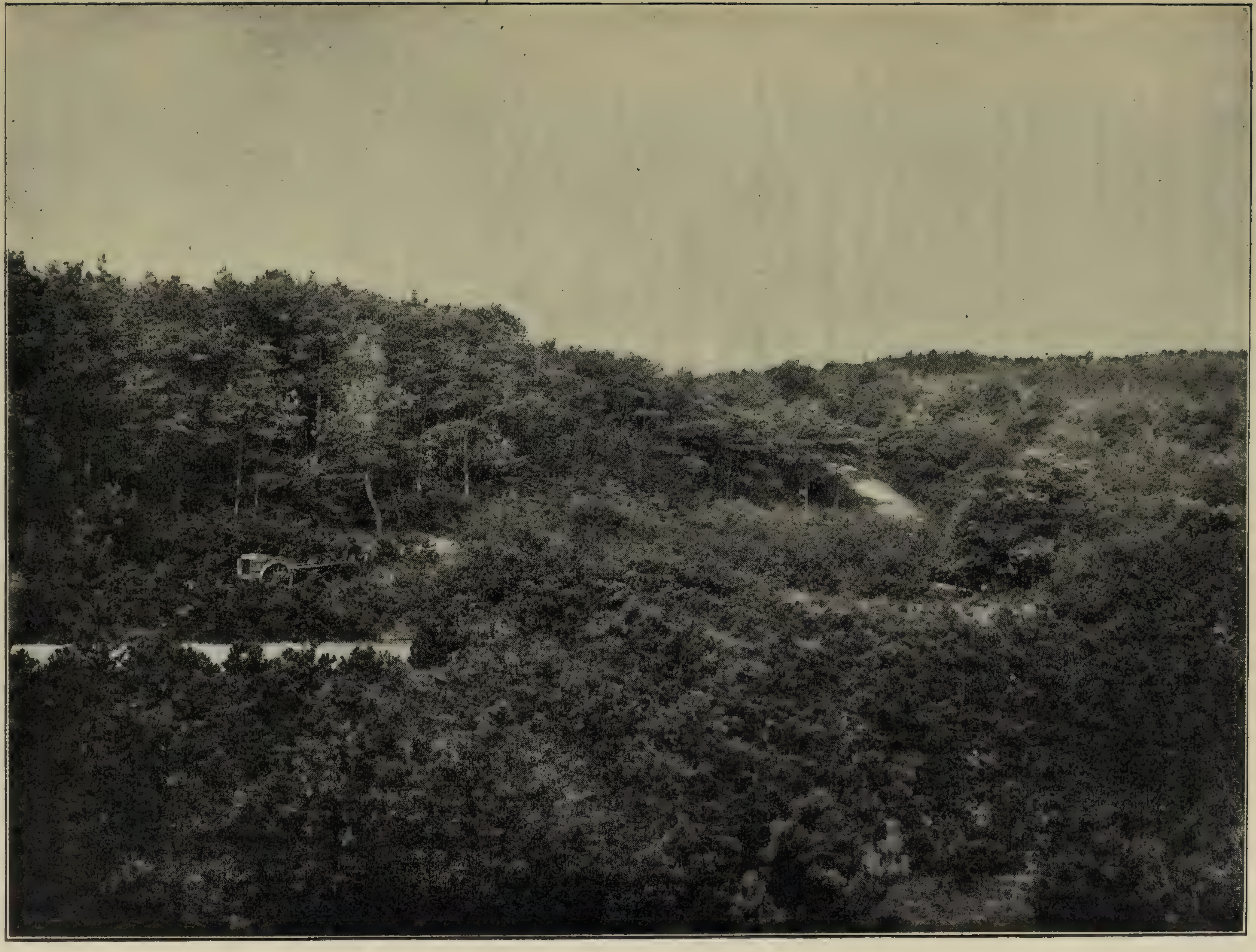
Sometimes the land is cut up in the hope that immediately after the sowing of grass and clover seed good grass sods of nourishing produce may be realised.

Very often this grass is grown together with oats as a covering down crop. Sometimes, too, these low-lying fens are turned into arable lands. In such cases, whenever sand is obtainable, a layer of sand is introduced, as in trenched lands. As there is an abundance of nitrogen in the low-lying fens, the development of these lands generally proves a highly remunerative undertaking, provided however that the drainage is not too costly.

Of the 37,000 H.A. of dunes, extending from the southern side of Zeeland Flanders to the island of Rottum, about 17,000 H.A. belong to the State.

As these dunes are of inestimable value as a defence from the sea and demand large outlays to prevent their shifting by being blown away in their wild condition, it is only natural that every effort is made to secure a permanent system of binding them down at not too great an annual outlay, as is occasioned by the planting of a coarse wiry grass which lasts but a short time. The State has for a long time now been especially trying the planting of shrubs in the dunes. Although this turning the dunes into shrubberies is not intended chiefly for the acquirement of arboricultural produce, but is mainly done with the intention of preventing the shifting of the sands, as mentioned, we must nevertheless regard this planting of shrubs as a development of the dunes, for the simple reason that waste lands are brought into cultivation.

Only 50 years ago, Dr. W. H. C. Staring zealously advocated the planting of shrubs in the dunes bordering on the sea, and put his ideas to the test by planting the State



Shrubberies on the dunes near Schoorl (North Holland).

dunes. The experiments turned out very favourably, as may still be seen here and there. "One day", said Dr. STARING, "our seadunes will be overgrown with trees", but no great progress was made in the planting of the dunes. It has turned out, however, that when the soil is worked well and care is taken in the selection of shrubs, most dunes may be succesfully planted. Experience has shown us that Pinus laricio austriaca and P. l. corsica yield very satisfactory results, that in some places the P. montana should be planted and that P. sylvestris answers very well in sheltered places in the dunes.

At the end of last century the planting of the dunes with shrubs was again to have been actively undertaken. The Netherlands Heath Association was requested to report on the subject, and as a consequence thereof that Association was entrusted with the planting of the dunes in several places.

In 1893 the State once more tried planting the dunes in Schoorl and in 1895 on the island of Texel. The Heath Association, which originally had the management of the undertaking, transferred it in 1899 to the State Arboricultural Control authorities. In 1913 there were about 400 H.A. of shrubberies in Schoorl, 225 H.A. in Texel, 30 H.A. in Vlieland and 75 H.A. in Ameland (chiefly done by the Netherlands Heath Association). The Association mentioned undertakes planting of the dunes for private people also, but there is no very great enthusiasm for shrubberies in the dunes.

The greater number of the proprietors of dunes regard them as a shooting ground in the first place, and therefore do not feel disposed to go to any great expense in planting them with trees.

Happily there are some very good exceptions. The shrubberies in Schiermonnikoog and near Bergen, Heemskerk, Wyk a. Zee, Santpoort, Bloemendaal, Wassenaar and elsewhere, go to show that private owners are not altogether indifferent to the planting of dunes.

It may be remarked in regard to the planting, that at the present time there is much more care taken in preparation of the soil than formerly. In former times holes from 30 to 50 c.M. deep were made for the plants. Now they make furrows from 30 to 50 c.M. in depth, or the whole of the plot is turned over to a depth of 50 c.M. Only where the sand is being blown away is it sometimes sufficient to make holes for the plants. It stands to reason that subsequent to the turning over the shifting of the sand must be prevented, and this is done by laying heather, coarse grasses, and lupin straw on the ground and by levelling down the steep ridges.

In the better and damper soil, provided there is sufficient shelter, trees of greater foliage may be planted, and that too with success. The oak especially answers well.

The planting of the moving sandhills is also vigorously being carried on. For instance, the State has undertaken the binding down of 2,000 H.A of moving sandhills at Kootwyk, which was originally started by the Netherlands Heath Association.

The "Oranjebond van Orde", with the hearty support of the "Quarter of a Guilder Association", which does a great deal in rendering unfruitful and poor districts fertile, bought the Eastern and Western sands at Uffelte and the Drouwen sands at Drouwen.

Under the guidance of the Netherlands Heath Association these waste lands were planted with trees, the province of Drenthe contributing fl. 50 ($ 20.—) per H.A. towards the cost of planting, as moreover is done for the planting of other moving sandhills.

In the Lierderbosch, in Schaddenveld, the Spelderholt, at Hoenderloo, Otterloo and elsewhere, we have instances of what the Netherlands Heath Association has accomplished towards fertilising the waste inland dunes, and it is a delight to see pretty country houses springing up where formerly barren hills of drifting sand once existed.

The real heaths may be divided into low-lying heaths, heaths of medium altitude and high-lying heaths.

The low-lying heaths are for the greater part being turned into pasture lands. Formerly after being drained they were generally very lightly turned over, then manured and sown with grass and clover. Now as a rule they are turned over somewhat deeper, this being generally done with a plough. Then one can sow the grass and clover together with rye, which constitutes a covering crop and proves beneficial to the growth of the grasses and clover, while moreover a fairly good crop is realised, so that in the very first year a pretty fair share of the cost of development is covered. It may be added that in some low spots, which could not be properly drained, fishing ponds have been made by the Netherlands Heath Association. Moreover this Association has done irrigation work, thus proving that under certain conditions in this manner the waste lands can profitably be cultivated.

The heaths of medium altitude become as a rule arable land. Frequently, subsequent to working and manuring, lupins are cultivated, and thus the soil is enriched with nitrogen and humus and naturally improved; but it often occurs, as with trenched grounds, that after having been very highly manured potatoes may be grown, and this as a very beneficial crop to the soil.

Where there is a demand for pasture land, the heaths of medium altitude are sometimes laid down as meadows. But to do this satisfactorily, it is often necessary to turn the lands first into arable lands for some years.

Many of the higher heaths are only adapted for wood lands. Extreme care is generally taken in the making of these woods. The ground is dug very deep, then lupins are planted, and for a year or two farm crops are cultivated. Provided plenty of manure is used these answer pretty well. Then only after all this has been done does the planting of the trees take place.

The cost of the woodlands is as a rule somewhat higher on account of the preliminary operations, but on the other hand the plants take better root and are stronger, while it is possible to plant on the prepared soil a larger assortment of trees, which demand more of the soil than the coarse pine tree. It is of great importance to plant a variety of trees because the soil then remains in better condition.

The many flourishing young trees that are seen indicate what may be achieved by the practical use of barren soil and show that there is hope of great results.

We may add that very good results have been obtained on fit soil from the sowing of coarse fir tree seed.

From the instances set forth in this article it will be seen that in the last twenty-five years, and especially in the last ten development has made great strides.

This has been rendered practicable by artificial manure, which enables one to increase the amount of sustenance in the soil for vegetable growth according to desire.

Far less would have been done in development if the landowners had not had the opportunity of consulting the Netherlands Heath Association and if that Association had not provided for the carrying out of the operations at a moderate price by an efficient staff.

This is proved in the adjacent countries of Germany and Belgium, where artificial manure was certainly not known at a later date than in this country, but where development is of less significance than in The Netherlands.

The Heath Association has made it possible for the inexperienced landowners to make their land fruitful. It has awakened the interest of townpeople in the barren heaths, and that to such an extent that a number of country houses now indicate the interest of the capitalist of the town. By giving information as to what seed is good for sowing and planting, by assisting in the disposal of the crops, etc., it renders the developed territory as profitable as can be.

When at first there was some difficulty in selling the timber of the first clearings, it organised a wood sampling section to help the members and by so doing promoted the laying out of woods.

For the advancement of planting of waste parish lands (about 90,000 H.A.) the Government advances money to the local authorities free of interest for a period of 50 years, to an amount not to exceed fl. 120 ($ 48.—) per hectare and 80 per cent at most of the cost of development. The operations are then carried out under control of the State Arboricultural Control, which by reason of the order underwent a very great extension.

The same advances may be enjoyed by bodies working for the general good, and in this way the Oranjebond van

Orde now also enjoyes a subsidy for its planting of waste lands in North Brabant.

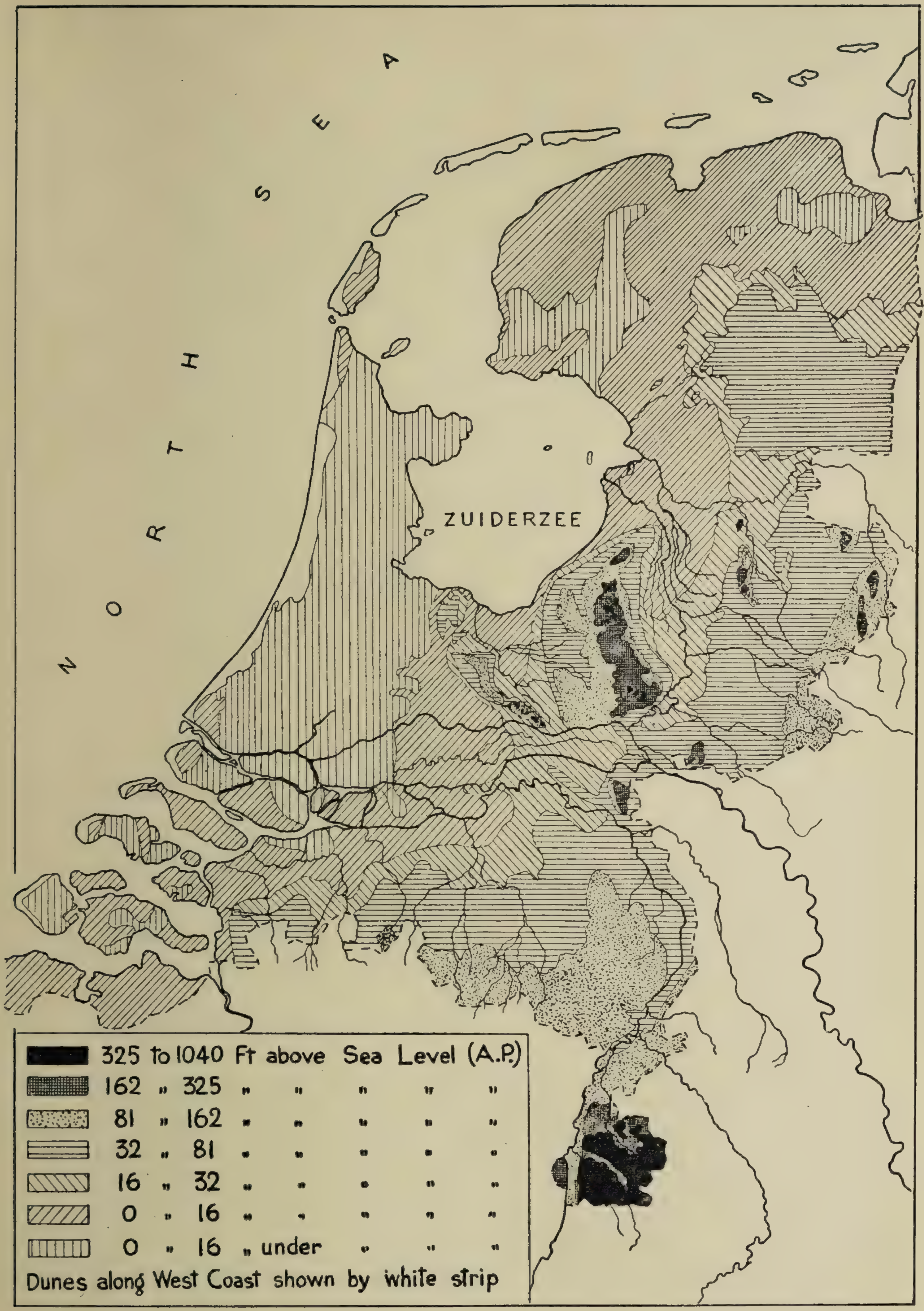
It had already been said that the province of Drenthe allows a subsidy of fl. 50 ($ 20.—) per H.A. for the planting of the moving sandhills.

The following table shows the areas developed in The Netherlands in the last 20 years :

Period.	Annual average of developed areas.
1892—1896	1,092 H.A.
1897—1901	2,210 „
1902—1906	3,962 „
1907—1911	7,031 „
1912	8,812 „
1913	9,644 „

Details of developments in The Netherlands in the last 10 years are also appended :

Years.	Turned into arable and pasture lands		Planted waste land.	Total culti-vated	Wood-lands turned into arable or pasture lands.
	Trenched peatland.	Heaths.			
1904	714	2,342	1,403	4,459	293
1905	757	2,001	1,020	3,778	287
1906	591	2,153	986	3,730	291
1907	637	3,025	1,310	4,972	519
1908	545	4,166	2,400	7,111	492
1909	441	5,315	901	6,657	500
1910	455	5,719	974	7,148	682
1911	502	7,196	1,616	9,314	973
1912	727	7,939	903	9,569	1,252
1913	974	7,092	1,006	9,072	1,385
1914	453	6,935	657	8,045	1,171


NORTH SEA
ZUIDERZEE
■ 325 to 1040 Ft above Sea Level (A.P.)
▦ 162 " 325 " " " " "
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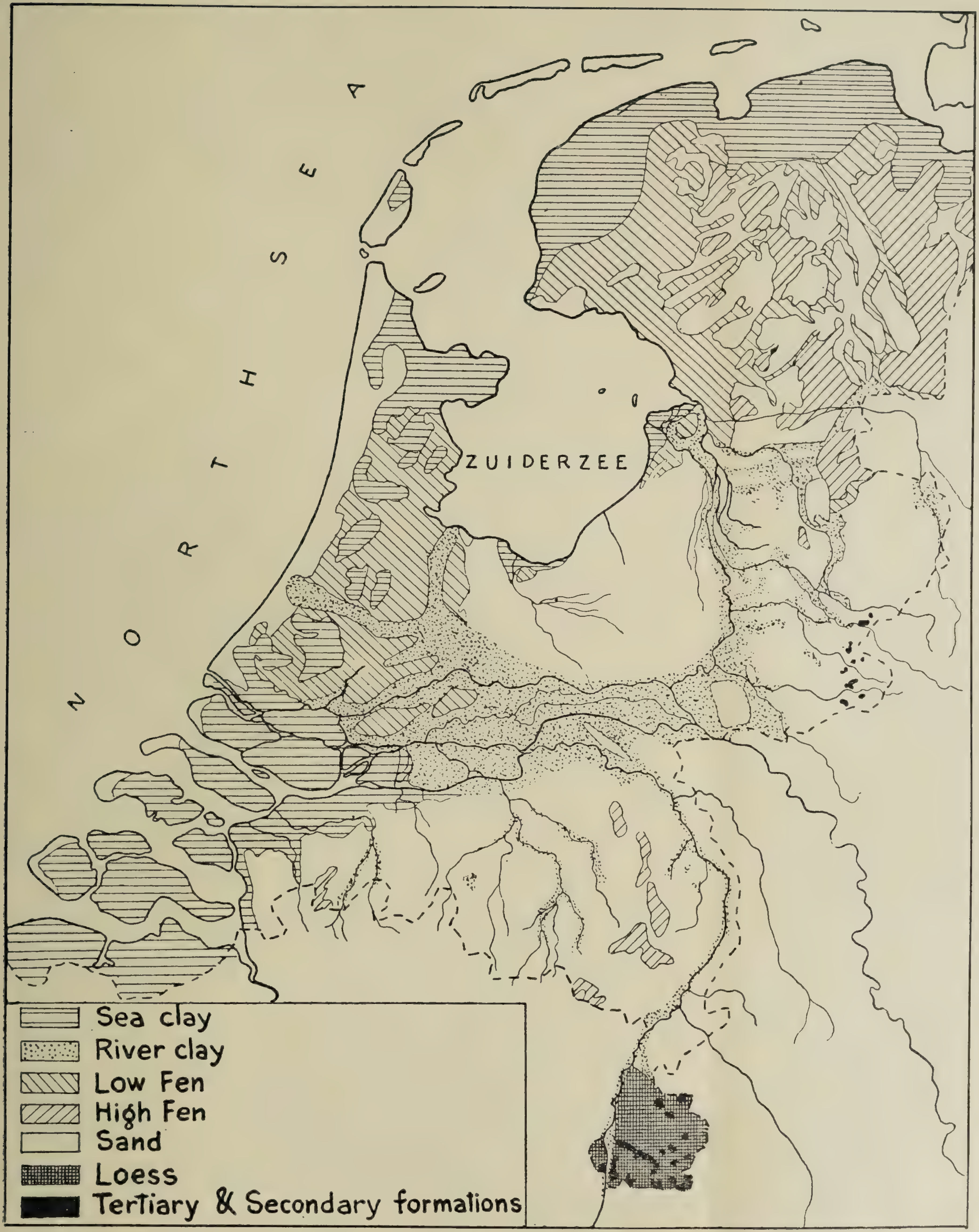
Dunes along West Coast shown by white strip


NORTH SEA
ZUIDERZEE
Sea clay
River clay
Low Fen
High Fen
Sand
Loess
Tertiary & Secondary formations

FAMOUS NETHERLANDS NURSERIES.

BRIEF SKETCH OF
HORTICULTURE IN THE NETHERLANDS.

Boskoop. Home of Kosters' Blue Spruce.

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FAMOUS NETHERLANDS NURSERIES.

BRIEF SKETCH OF HORTICULTURE IN THE NETHERLANDS.

THE GARDEN OF PLENTY.

THE natural conditions prevailing in many parts of The Netherlands are very favorable to the development of intensive horticulture. The climate along the shores of the North Sea is mild and damp, the soil naturally fertile. Climate and soil are aided by a most ingenious system of regulating the water-supply. All surplus water is pumped away by huge steam-pumps, leaving only sufficient moisture for strong and healthy root-action of the plants. The numberless waterways which intersect the country in all directions make the conveyance of manure and other materials, not to speak of the transport of products, extraordinarily easy and cheap. Finally, the geographical position of the country, close to the greatest purchasing centres of Europe, ensures a constant market for her products.

Consequently it is not surprising that already in early times a flourishing gardening trade sprang up in The Netherlands, which country was famous for the excellence of its horticultural produce as long ago as the 16th century. Another result was that certain special staple crops were grown in particular districts, which proved peculiarly well adapted to their production; and in consequence of this specialisation generations of gardeners grew up, who thoroughly understood their business and brought it to its present high standard of perfection. A further contributory factor was the circumstance, that other local conditions, such as trade, markets, traffic and even technical education, all adapted themselves to the needs of these special branches of horticulture.

The importance of Netherlands horticultural industry is clearly shown by the fact, that over 3 per cent of the total area of cultivated land in The Netherlands is occupied by various branches of horticulture.

TRADE ORGANISATION.

A very important cause of the economical and social prosperity of the Netherlands horticulturists has been the quickness with which they have realized the value of trade-associations on co-operative lines. These organisations worked wonders for the benefit of their members, and in 1908 many local societies combined and formed a Federation called "*The Netherlands Horticultural Federation*". This body already comprises 124 of the most important associations and societies with a total membership of over 27.000.

Its object is to protect and promote the general interests of Netherlands Horticulture. It represents Netherlands Horticulture in 6 branches: Vegetable growing, Seed growing, Fruit growing, Arboriculture, Floriculture and Bulb growing.

The Council consists of 18 professionals, 3 for each branch. One of the activities of this Federation is to promote horticultural expositions both in The Netherlands and abroad and the elaborate Horticultural Show at the *Panama-Pacific Exposition* is the result of its endeavors. The famous exhibits at Dusseldorf, Mannheim, Berlin, Brussels, Buda-Pesth, London, Ghent and Petrograd (St. Petersburg) were planned and carried out by this Federation.

The plans for the Netherlands Horticultural Section at the Panama-Pacific Exposition were drawn up by the well-known Netherlands landscape-architect, Mr. D. F. Tersteeg of Naarden.

NURSERIES AND NURSERY TRADE.

Amongst the important industries of The Netherlands the nursery trade contributes greatly to its welfare. Thousands of acres of fertile soil are covered with nursery-stock of infinite variety. The nurseries are located in various parts of the country, wherever the different kinds of soil, whether

Boskoop. Conifers in all varities.

Boskoop. Extensive Rhododendron fields.

moorland, alluvial clay or sandy grounds possess in the highest degree the excellent capacity for retaining moisture.

These conditions, assisted by the ideal sea-climate, make the variety of nursery-stock that can be grown in The Netherlands greater than in any other European country.

The entire area of nursery-land is in the hands of about 1,500 nurserymen. The bulk of their products is exported, their largest customers being the United States of America, the German Empire, The United Kingdom, Belgium and Scandinavia. The price of land is very high and skilled labor highly paid. In spite of this, the Netherlands nurserymen are able to compete with those of other countries, as a result of their greatly perfected system of tree-growing and their large and reliable crops.

Boskoop.

This is the most important centre of the nursery-industry in The Netherlands. It is situated in the centre of the province of South Holland, close to the largest cities and the important sea-ports of Rotterdam and Amsterdam and only at a short distance from the residential city of The Hague.

As a nursery-town, Boskoop stands unique among other nursery-centres. The district is divided into about 800 large and small nurseries. The smaller places are run by working people who are employed by the larger concerns or help their neighbors part of the week and devote the rest of their time to their own business. They generally start with a very small patch of ground, worked at odd hours, mornings and evenings; later they get an occasional day off and finally possess their own independent business. The large employers encourage this idea. It tends to make the man industrious and intelligent and results in producing skilled labor.

There is another great advantage in these numerous small nurseries. The stock is grown under the personal care of the owner and is not subject to the neglect of incapable and irresponsible employees.

Boskoop owes its world-wide reputation to the excellent quality of the stock it produces.

The rich moorland is an ideal soil for Alpine plants and Conifers as well as for numerous other articles. The plants make an abundance of fibrous roots, which render transplanting safe. The soil is hygroscopic to a high degree, which is an important factor for shipping to distant countries, and it is a well-known fact that plants shipped from Boskoop can travel round the world without injury to their vitality.

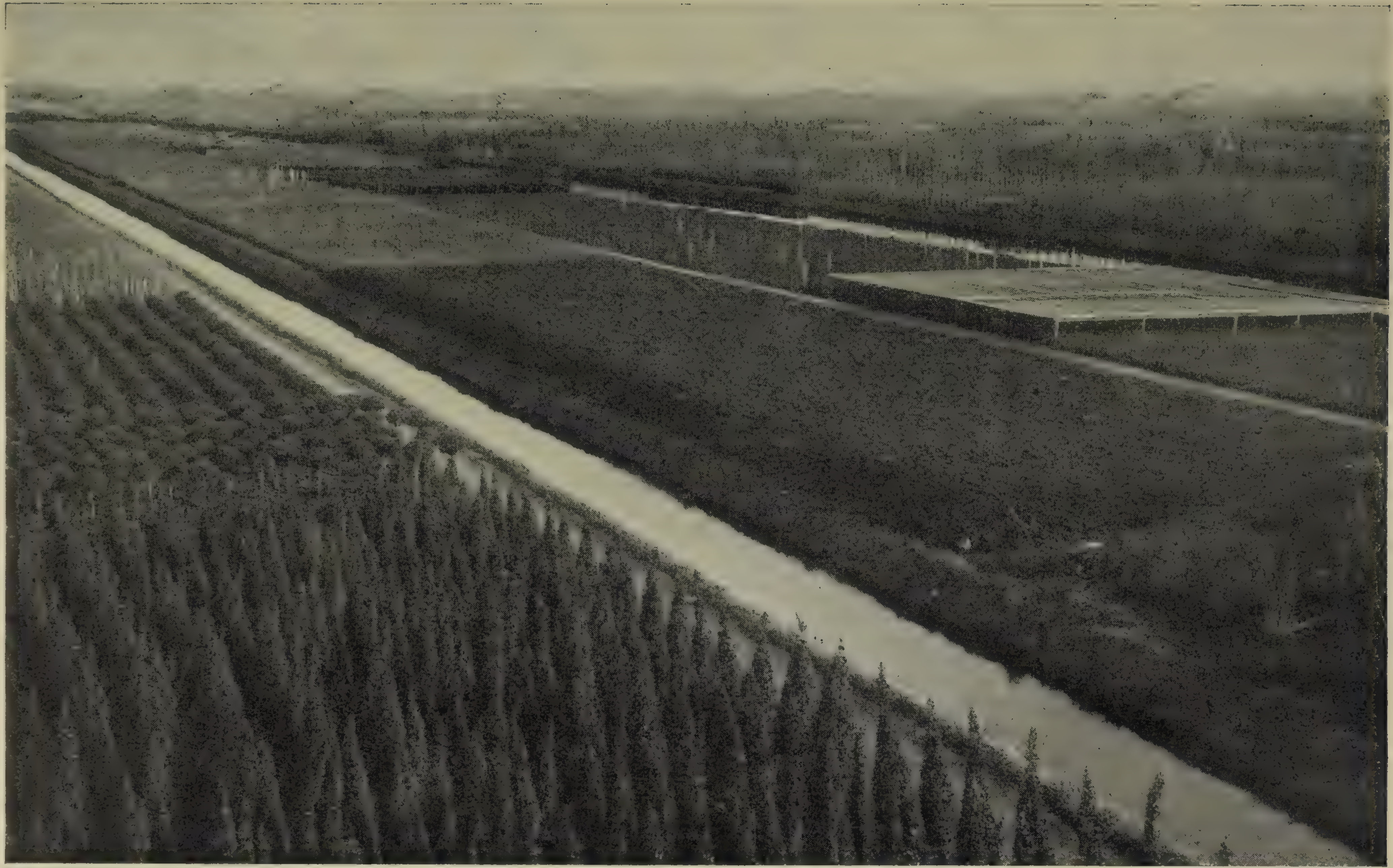
It is impossible to catalogue in this short description all the varieties of plants cultivated at Boskoop and exported from there, but Boskoop may be truly called a complete department store of plants. The most important specialities are: Rhododendrons, both for outdoor planting and forcing, hardy Azaleas, Conifers in infinite variety; Boxwood in all shapes and forms; hardy climbers such as Clematis, Ampelopsis, Wistaria, Aristolochia, Japanese Maples, Magnolia; evergreens such as Hollies, Aucuba, Lauro-Cerasus; perennials such as Peonies, Phloxes, Dielytra; potgrown plants for forcing, amongst which the Lilacs are famous.

Especially in *Roses* Boskoop is very productive and exports several millions in both bush and standard shape annually. The Roses are chiefly worked on the Rosa rugosa stocks. Roses worked on this stock have proved to be very adaptable to forcing and surpass those grown on canina and Manetti.

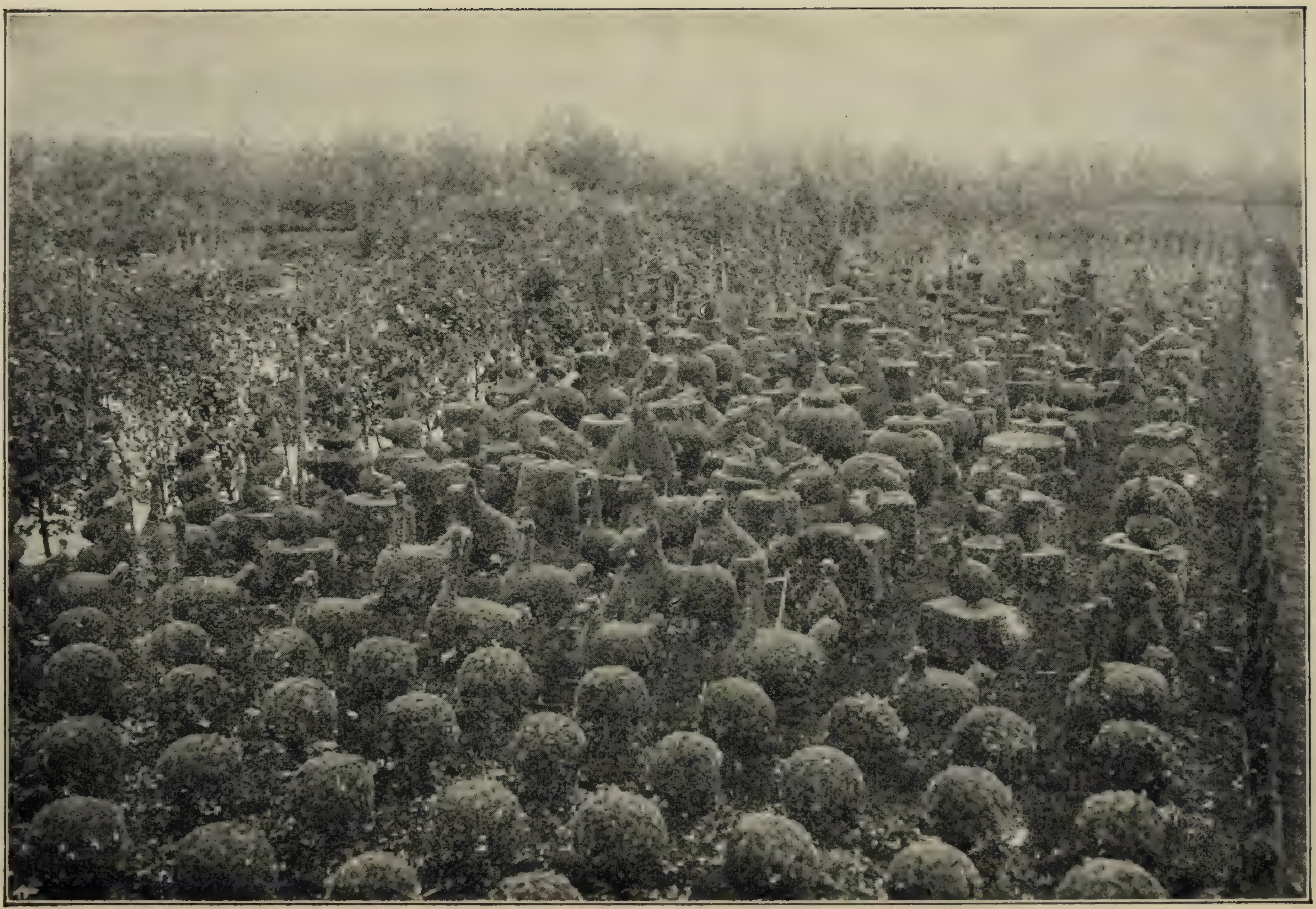
The Boskoop nursery trade is run on modern methods. Packing and shipping facilities are up to date and the proximity of the seaport of Rotterdam ensures frequent shipping opportunities.

Aalsmeer.

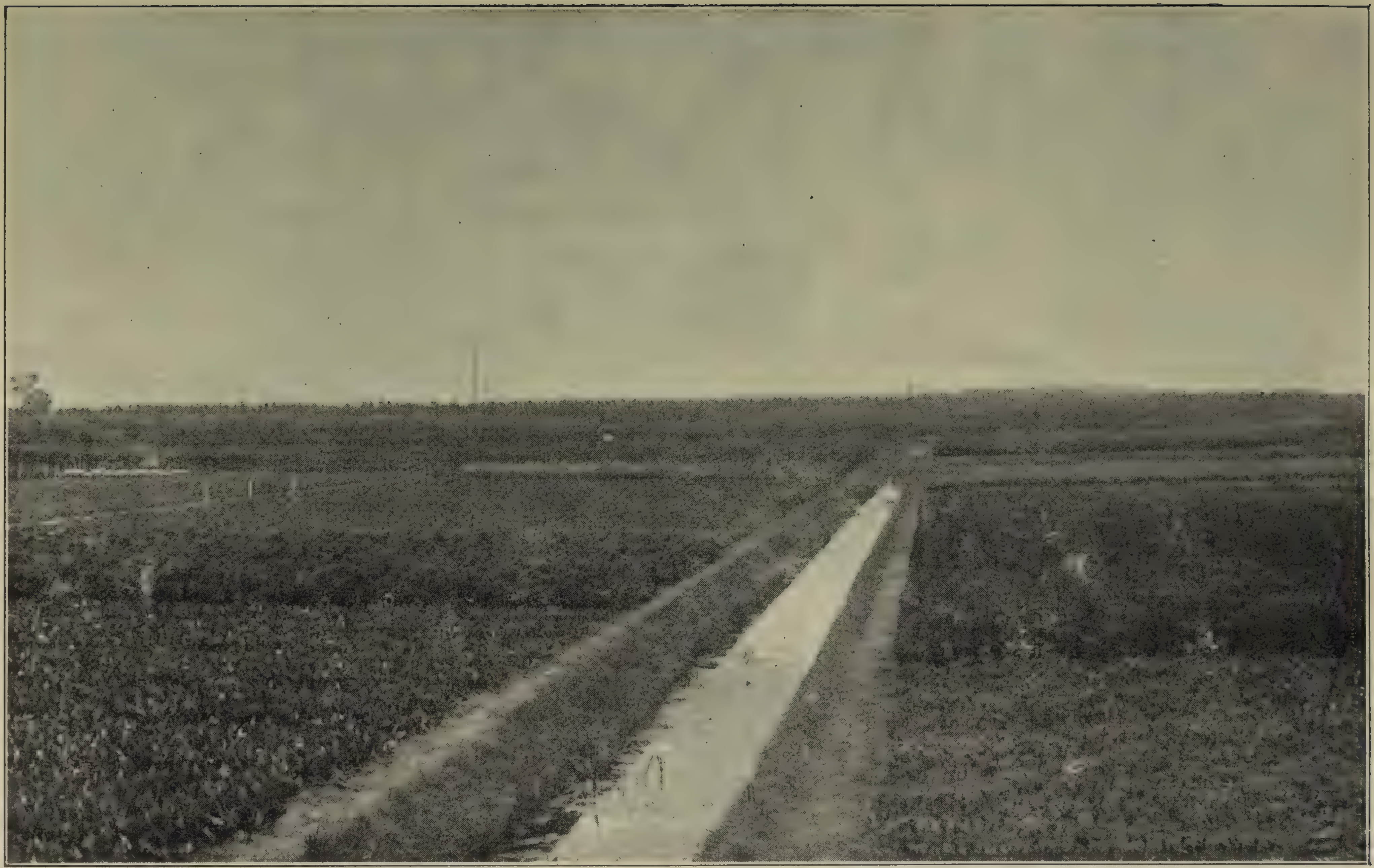
This is another important centre of the nursery trade. It is located in the province of North Holland, close to Amsterdam, the capital of The Netherlands. It is, like Boskoop, situated on rich moorland and its nurseries are, consequently, closely related to them. In the last few years however the cultivation of cutflowers has developed to such an extent that the tree-nurseries no longer alone take the foremost place. The perfection to which the Aalsmeer nursery-men force Lilacs, Roses, Chrysanthemums, Lilies of the valley and other plants won for them a



Boskoop. Nursery Vieuw.



View in a Nursery of Clipped box and yew trees in Aalsmeer.



Naarden. Nursery View.

Naarden. Nursery View.

European reputation. The cutflowers are carefully packed and reach in fresh condition places, situated as far distant as Petrograd (St. Petersburg) in Russia. A trial shipment to New York arrived in splendid condition last winter.

The nursery-men of Aalsmeer are noted for their skill in clipping Boxwood and Yews into all sorts of shapes. These clipped trees are very useful in formal gardens and present objects of real beauty and of enormous value. Years of patience and inherited skill are required to produce perfect shapes of dogs, fowls, swans, ships and spirals, sometimes placed on globes and cubes. Among the Netherlands nursery-towns Aalsmeer ranks as a most interesting place.

Naarden-Bussum.

The large and up to date nurseries at and around Naarden-Bussum are also well-known and enjoy a world-wide reputation. Shade and fruit-trees are grown here on a larger scale than at Boskoop and Aalsmeer The soil is a sandy loam of splendid structure. In some parts the soil contains a certain admixture of moor which allows the cultivation of Alpine plants. In the last fifteen years Boskoop methods have been adopted in several nurseries with increasing success. They export large quantities of Rhododendrons, Azaleas, Hollies, Conifers, of which there is a large assortment, Hydrangeas, Climbers, Japanese Maples, Spiraeas and Lilies of the valley.

The town is situated close to Amsterdam and has good and frequent shipping facilities to the seaports of that town and of Rotterdam.

Oudenbosch.

An important export-place of nursery-stock is the town of Oudenbosch in North Brabant. Its nurseries are located on sandy soil. Enormous quantities of shade and ornamental trees are grown here to the acme of perfection.

The chief exports to the United States are composed of: Norway Maples, Schwedler's Maples, Lindens, Chestnuts and all other shade-trees, flowering shrubs of any description, hedge-shrubsplants, evergreens and climbing plants.

Nursery View at Oudenbosch.

Nurseries are situated at Roosendaal and Zundert near Oudenbosch. Those at Zundert chiefly grow young stock for forestry. Millions of young plants are exported annually.

Veendam.

Veendam is in the north of The Netherlands. The principal articles grown here are: Pear, Apple, Mahaleb, Mazzard, Myrobalan and Quince stocks, the quality of which is universally admired on account of its healthy constitution and well-developed root system. The nursery-centre of Veendam, though comparatively young, shows a phenomenal prosperity, due to the adaptibility of its soil, the favorable situation, the energy of the growers and the pains they take in growing and selecting their stock.

Other nursery towns.

Besides the places already mentioned, important nurseries are found in various other places in The Netherlands, some of them of historical importance. Reputed Rose-nurseries are found at Haps, Steyl-Tegelen, Arnhem, Heerde and Assen. Fruit and ornamental tree-nurseries at Joure, Leeuwarden, Bergum, de Bilt, Maartensdijk, Kapelle, Ede, Gemert, Haaren and Hoeven. Important nurseries of perennials are at Dedemsvaart, Leyden, Alphen on the Rhine and Hilversum.

BULB GROWING.

The sandy inland soil behind the dunes which guard the western sea-coast of The Netherlands is ideal for bulb growing, perhaps the most characteristic branch of Netherlands Horticulture.

It is a very old industry, dating back to the end of the 16th century, when the original Tulips and Hyacinths were brought over from the East. The Tulip was the first bulb regularly taken into cultivation and even in the 17th century it was eagerly sought for by collectors. This bulb indeed was the object of wild speculation, which finally culminated in

Tulip Fields.

Hyacinth fields In the background dunes the great "Tulip swindle" of 1637, by which many people were ruined. It was not, however, till somewhat later that a few growers in Haarlem began to produce regularly bulbs for export. The Hyacinth took the leading place in the 15th century. Since 1750 the cultivation and export of bulbs has been carried on regularly in The Netherlands, though the industry did not attain its present gigantic proportions before the last decades of the 19th century.

The bulbgrowing industry was at first confined to Haarlem and its environs, but has gradually extended, wherever a suitable piece of land was available. In order to grow bulbs, meadows have been transformed and sand dunes leveled.

The narrow strip of land between Alkmaar and Leyden and also to the north and south thereof possesses the qualities requisite for the bulb culture. The structure of the soil, the favorable climate, the well-regulated water-level, in short all the natural attributes and last but not least the skill of the population, who have been trained to this work for more than three centuries, have made bulb growing in The Netherlands an industry of unrivaled perfection.

Personal relations with customers.

Besides the scrupulous care the nursery-men of The Netherlands take in growing, selecting and packing their stock, the fact that most of them are personally acquainted with their customers abroad contributes largely to their success. Their annual trips have three important objects, first the sale of their products, secondly the study of the needs and wishes of their customers and thirdly the study of the manner of transportation and shipping. And by taking care of every little detail in filling and shipping their orders the Netherlanders have established a reputation, which is the more deserved as they have done their utmost to place it on a sound basis.

SEEDS.

In the last 25 years the growing of seeds in The Netherlands has developed to an enormous extent, especially in the provinces of North Holland and Groningen. In North Holland alone there are 5,000 acres devoted to seed growing, of which the town of Enkhuizen is the centre. In the province of Groningen there are more than 3,000 acres under cultivation.

Vegetable seeds are the principal kinds cultivated, but also flower seeds are grown to an increasing extent. The smaller growers cultivate the seeds mainly for a few great firms, who command the entire seed trade and export large quantities abroad.

VEGETABLES.

The natural conditions of The Netherlands are extraordinarily favorable for the successful development of market gardening. The Netherlands after supplying her own wants (which are almost exclusively met by the home production), exports enormous quantities of vegetables. These are chiefly grown in the provinces of North and South Holland, both of which are washed by the North Sea. The chief crops raised are Cabbage, Cauliflower, early Potatoes, Cucumbers, Tomatoes, Onions and Brussels Sprouts; Peas, Spinach, Carrots, Beans and Lettuces are also grown in large quantities.

FRUIT.

Of the different branches of Horticulture in The Netherlands the fruit culture occupies the largest area, and although the method of culture followed is often not so intensive as in other branches, the quantity of fruit produced is very considerable. Especially Apples, Pears, Cherries, Plums, Grapes and different kinds of Currants and Berries are exported in large quantities.

Special mention should be made of the cultivation of hothouse-Grapes in the "Westland" district. The technical skill displayed in producing this fruit has reached a perhaps unique degree of perfection. *Frankenthaler (Black*

Frames for forcing.

Orchard used for pasture.

Hamburgh), Gross Colman and Black Alicante are the varieties chiefly grown; large consignments are shipped to New York nowadays.

FLOWERS.

The flower industry flourishes particularly at Aalsmeer, about nine miles south-west of Amsterdam. It is a very old industry in Holland, dating as it does from the year 1695, but its great development only began in the latter half of the 19th century, after the draining of the Haarlem Lake. Cut flowers, "greenery" and pot plants are produced on a large scale. Of late years, too, the business of forcing has been greatly developed, and it is now possible to supply fresh Dutch flowers all through the winter. The first consignment of cutflowers was shipped from Aalsmeer to New York last winter and arrived in splendid condition.

The very fertile soil is extremely suitable for growing vigorous plants, with long stems and large flowers and sprays, qualities for which the Aalsmeer cutflowers are famous.

A great feature of the industry is Lilac forcing, and about two million sprays are exported during the winter. The long stems of the Dutch Lilac are greatly prized by florists. Large quantities of Roses, Lilies of the valley, early Chrysanthemums (ready for the market from the midle of August), Carnations and Tuberoses are also grown, and millions of Begonias, Cyclamens and Primulas are sold as potplants for house and garden decoration.

HORTICULTURAL TRAINING AND PHYTOPATHOLOGICAL SERVICE.

As might be expected from the practical results obtained, horticultural training in Holland has attained a very high standard of excellence. It is divided into three grades—higher, secondary, and elementary.

Higher horticultural education is given in the Government "High School for Agriculture, Horticulture and

Inside of a house for forcing cutflowers in Aalsmeer.

Forestry" at Wageningen. The course lasts three years, and embraces the following subjects: —

(*a*) *First Year:* — Physics, meteorology, plant-physiology, mineralogy and soils, chemistry, national economy, drawing, general plant culture, mathematics, surveying and levelling, mechanics, botanical terminology and practical work.

(*b*) *Second Year:* — Botany, plant-pathology, free-hand drawing, garden-architecture, treatment and improvement of soil, surveying and levelling, agricultural chemistry, theory of manures, systematic classification of horticultural plants, arboriculture, fruit-culture, vegetable and flower-culture, national economy and business methods, civil law and practical work.

(*c*) *Third Year:* — Botany, pytropathology, free-hand drawing, garden-architecture, theory of manures, systematic classification of garden-plants, arboriculture, fruit-culture, vegetable and flower culture, national economy and business methods, civil law and practical work.

At the end of the first year only those students are admitted to examination who have successfully attended a five years' course at a high school, or who can show that they are qualified to enter a University. To the examination at the end of the third year only those students are admitted who passed the previous year's examinations, and have been employed one year at practical work.

Those who have obtained the Horticultural Diploma may continue their studies in order to qualify for the "Secondary Teacher's Certificate" which is essential to those wishing to become Government horticultural teachers.

Attached to the College at Wageningen is an experimental garden for practical work, and in this garden the Phytopathological Institute is situated. This institution gives information to farmers, gardeners and foresters with regard to plant-diseases and pests, and the best means of dealing with them. It is further devoted to scientific investigations with regard to plant-diseases.

The Director of the Institute is, at the same time, Head of the Phytopathological Service, and in that capacity

Phytopathological Institute at Wageningen.

supervises, as far as possible, all nurseries, orchards, and bulb fields, and in particular those belonging to exporters. Gardens pronounced to be free of dangerous diseases and pests receive a certificate to that effect from the Director, and are allowed to enclose this certificate with the produce exported by them.

The Government agricultural and horticultural instructors are directed to report to the head of the Phytopathological Service the occurrence of any plant-disease within their districts.

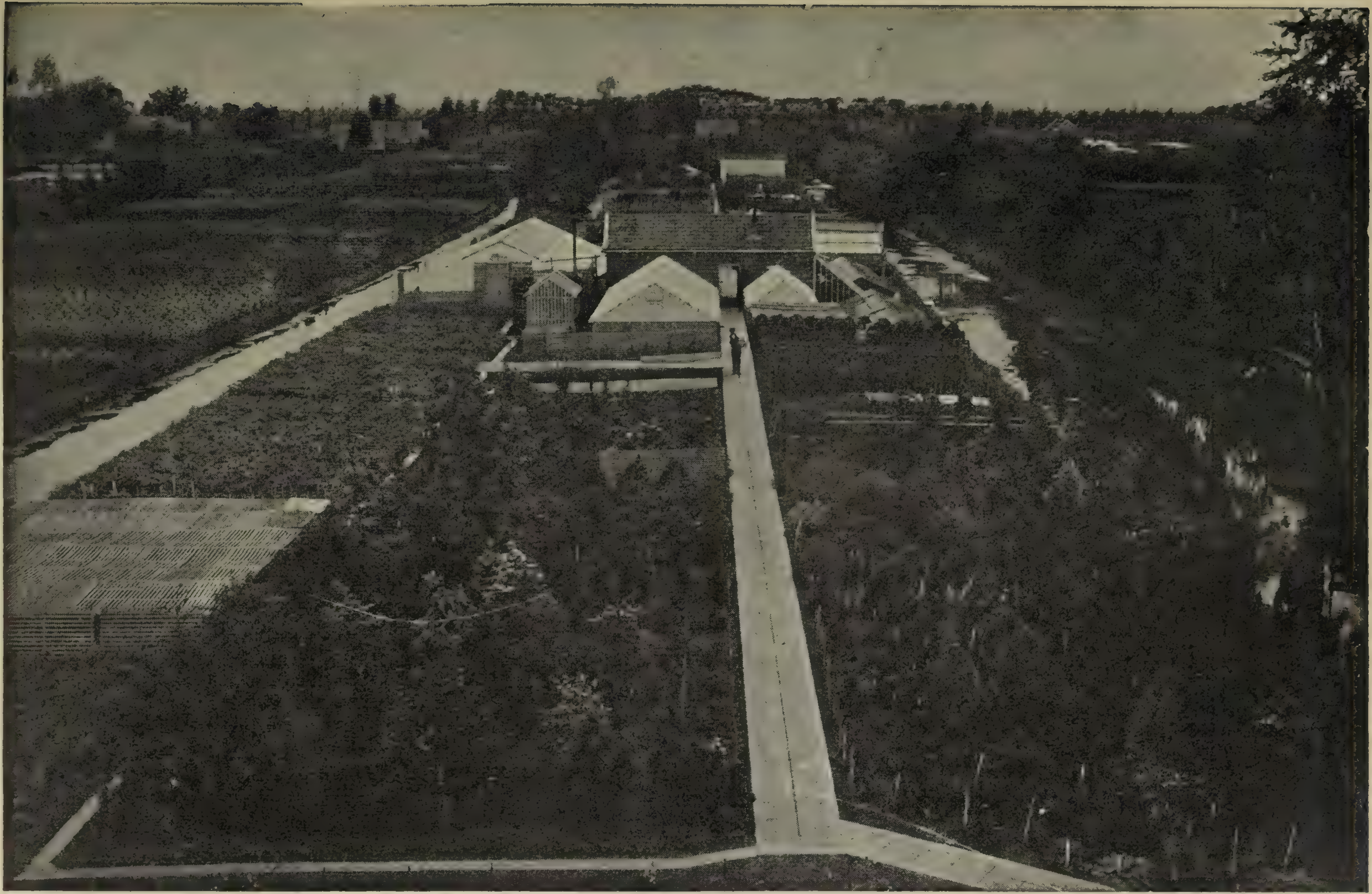
Secondary training in Horticulture is given in five Government Horticultural Winter Colleges (Aalsmeer, Boskoop, Lisse, Naaldwijk, Hoorn) and at the "G. A. VAN SWIETEN Horticultural College" at Frederiksoord, which receives a grant from the State. The object of these winter-classes is to give, at moderate cost, to young gardeners the theoretical knowledge necessary for their work. The schools are divided into two classes, and the period of instruction covers two winter-semesters. Students must be at least 16 years of age, and have to pass a preliminary entrance examination. The instruction is varied, as far as possible, to suit local conditions.

The "van Swieten School" provides both theoretical and practical training and the course extends over six periods of 6 months. At this school more especially head-gardeners are trained.

Attached to these colleges are more or less extensive gardens, where students receive practical instruction and experiments are carried on.

Elementary horticultural training is given in the winter-courses which the State supports with money grants. Each course extends over two winter-semesters. Students enter every two years, and must be at least 15 years of age. The teaching is done by National School teachers who possess the necessary qualification. Qualified practical gardeners are also employed to teach in many places. The course comprises:—

(*a*) The elements of natural science, including plant-diseases and pests.



Garden, attached to the government horticultural winterschool at Boskoop.

(*b*) Manures, soils, treatment and improvement of the ground.

(*c*) Fruit-culture, vegetable and flower-culture, arboriculture and horticultural drawing.

As far as possible, the instruction is adapted to meet the requirements of the kind of gardening practised in the locality. In 1913/14 the number of the winter-courses was 132.

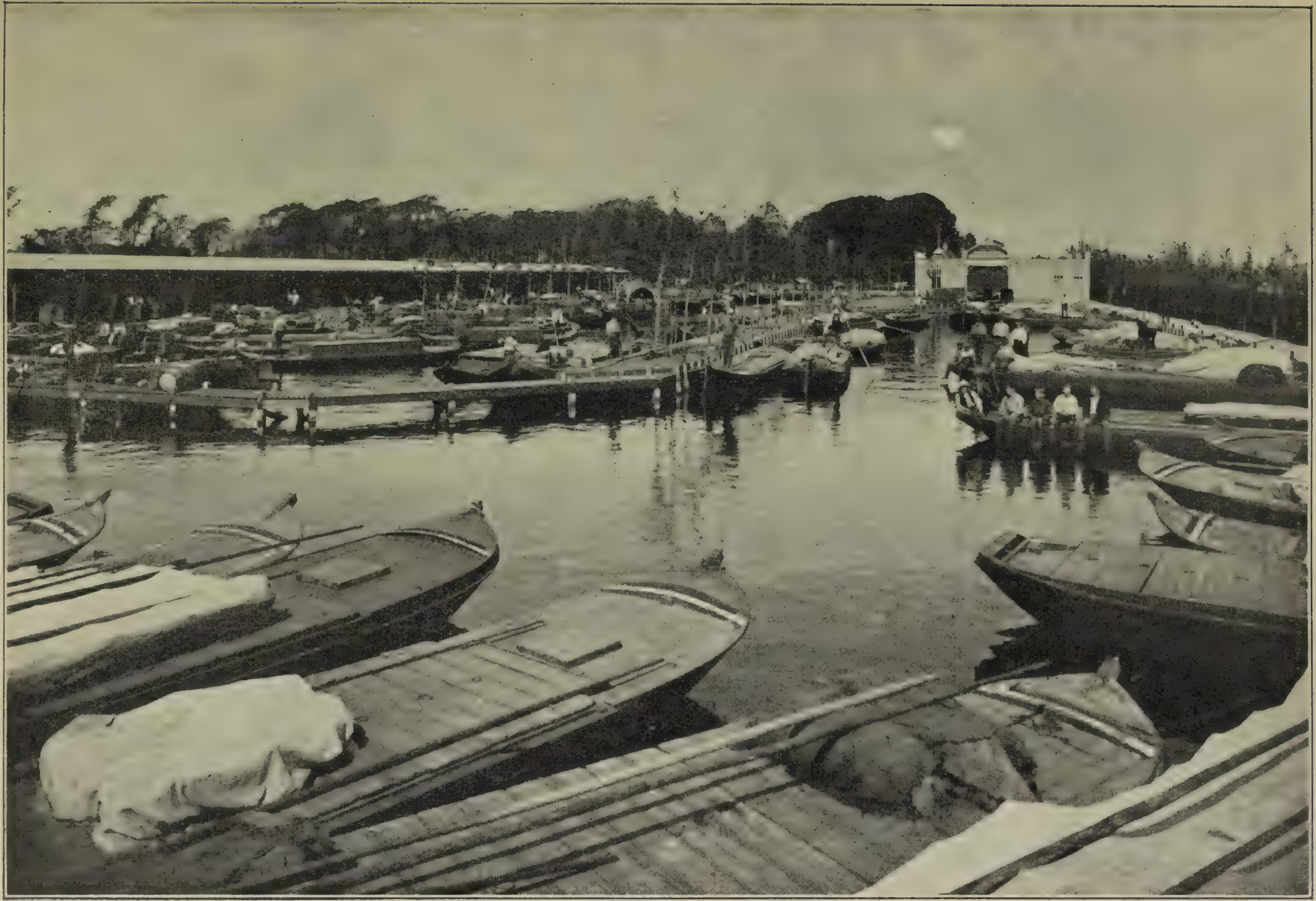
Besides these courses for young people there are special courses for adults. In the 1913/14 season there were 72 of these courses, all receiving grants from the State. The Government also assists horticultural societies which organise lectures and courses.

The State has further appointed 12 horticultural teachers in different parts of the Kingdom, whose duty it is to advise officials and professional gardeners, deliver lectures, lay out experimental plots, conduct experiments, and in general further the interests of Horticulture. They also supervise the horticultural courses held in their districts and coach the National School teachers who desire to qualify for the diploma mentioned above. In this they are assisted by different teachers in secondary schools, gymnasia, etc. Five of them are at the same time Directors of the Government Horticultural Winter Colleges above mentioned.

The courses of Horticulture followed by National School teachers last three years. Instruction is generally given for three hours on Saturday evenings. The examinations for the teachers' certificate are held every year at Wageningen.

CO-OPERATIVE MARKETING.

Any account of gardening in The Netherlands would be incomplete without a word on the co-operative marketing of garden produce, which is probably more highly organised here than in any other country. In this country the individual grower does not market his own produce; this is done for him by the association to which he belongs. To this end the various associations established sale depôts, known as "Veilingen" or auction places. Sometimes the "Veiling" is



Canoes with vegetables at the auction place at Loosduinen.

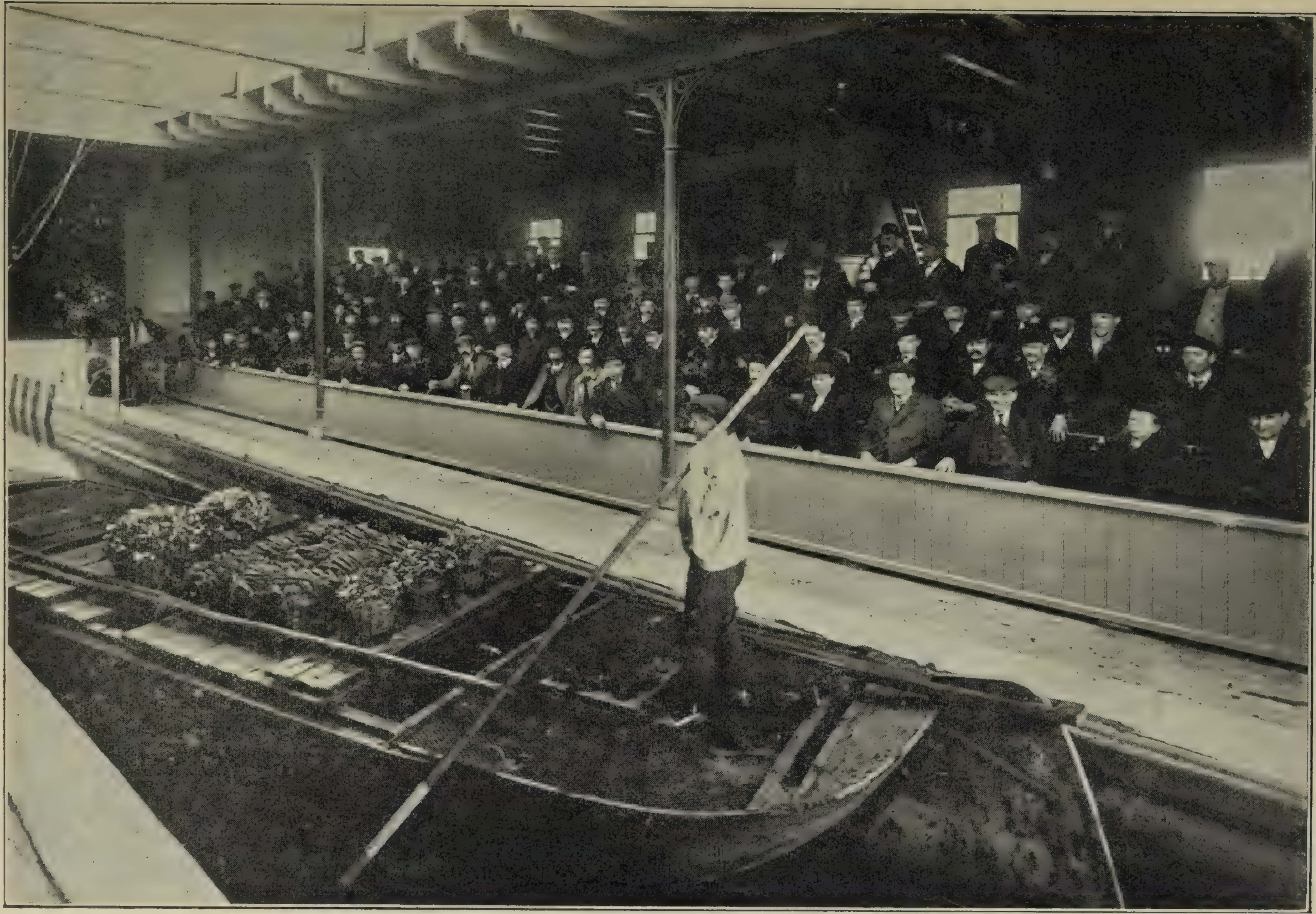
situated in the public market place, with a small space roofed in, where the sales take place. In other places the sale is held in a spacious market-hall provided by the association. The produce, brought to the "Veiling" by the members, is there sold by the officers of the association. The order of procedure is strictly fixed by rules, to which both members and buyers have to conform.

The method adopted is that of the so-called "Dutch auction", which also obtains in the fish, butter, egg and other trades.

Briefly it may be described as follows: The auctioneer "puts up" a lot at a certain figure, somewhat higher than the expected price. He now reels off in a monotonous tone of voice a string of steadily decreasing prices, which are closely followed by the buyers, who by a sign (most often the monosyllable "mine") signify their willingness to pay the price last named. The auctioneer's decision is absolutely final, in case of dispute as to which was really the first of two or even three would-be buyers, whose shouts would seem to have been uttered simultaneously to any uninitiated spectator.

In some larger sale depôts the auctioneer is replaced by an automatic electric apparatus, consisting of a large clock-face, marked with figures, which is fixed to the wall. A long hand or pointer travels round indicating the prices on the disc from high to low, whilst on a board beside the apparatus, numbers spring out to indicate the various buyers. The buyers sit on benches facing the apparatus. Each has his finger on an electric button. When anyone presses his button the indicating hand stops at the price then reached, and the buyer's number appears on the board. The sale is carried on in this way without any noise or dispute. In places where the produce is brought in boats, these pass along a small canal between the buyers and the electric machine.

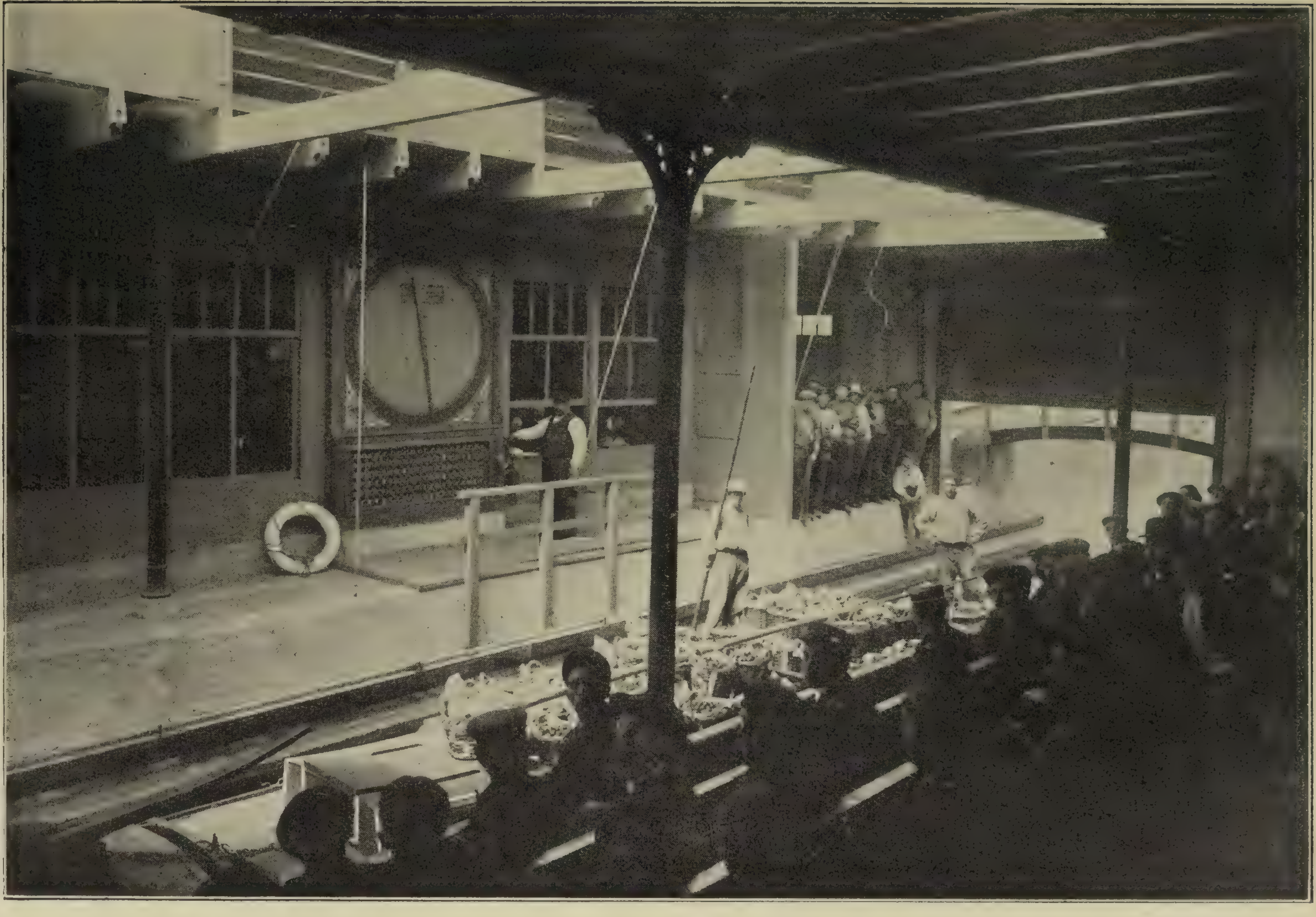
The goods are not sold on a mutual basis, but each gardener receives exactly the amount realised by his produce. On the other hand, abuses which prevailed formerly, such as depression of prices by buyers, under-weight, and bad quality and bad grading of goods on the part of gardeners, no longer occur. The expenses of building, repairs, salaries to servants



Loosduinen _ Buyers at the auction sales.

and the like are borne by the members in proportion to the value of the goods sold by each at the "Veiling".

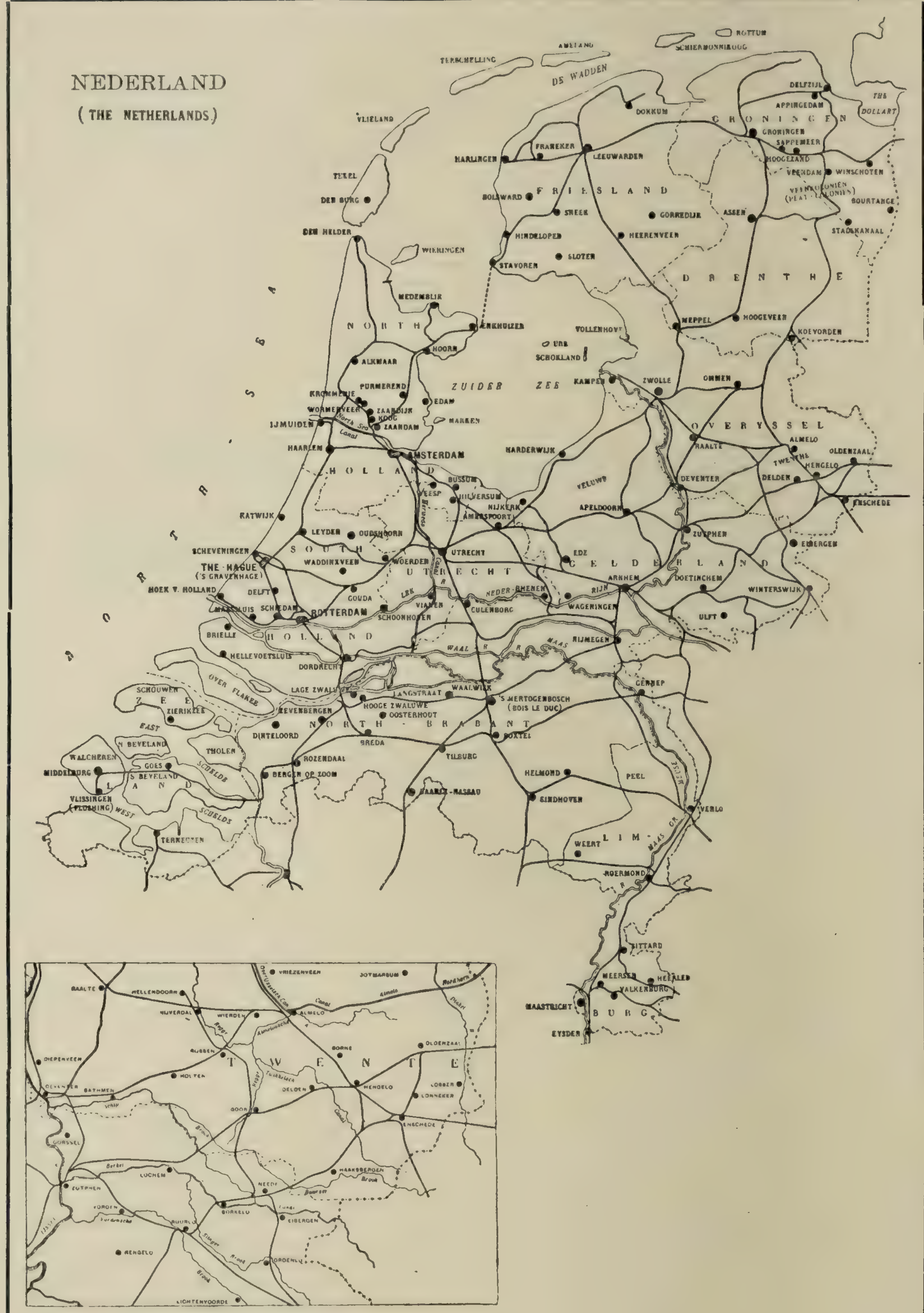
The majority of these sale depôts are of recent date. The first were established in 1887 at Broek op Langendijk. In 1897 their number was only 15, but after that year they increased rapidly, and at the present time they number more than 80. The total value of the vegetables and fruit sold at the "Veilingen" is more than $ 10.000 000 a year.



Loosduinen. Electrical auctioneering apparatus.

THE INDUSTRIES OF THE NETHERLANDS.

COMPOSED BY THE COMMERCIAL DEPARTMENT OF THE
MINISTRY OF AGRICULTURE, INDUSTRY AND COMMERCE
WITH SPECIAL ASSISTANCE OF MR. DOYER, SECRETARY
TO THE ROYAL NATIONAL RELIEF COMMITTEE.



Twente, Centre of the Textile Industry.

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PART I.

THE TEXTILE INDUSTRIES, THE HIDE TRADE AND ALLIED INDUSTRIES.

THE textile trade is numbered among the industries of which The Netherlands may well be proud, not only from the historical and geographical point of view, but also in the economic and commercial respect. From the technical point of view, it will bear comparison with the countries that have taken the lead in industrial progress.

It is one of the oldest trades in the country It arose from the needs of the population, combined with its natural tendencies. On the one hand, agriculture and cattle-breeding, even in the olden times, supplied the raw materials, such as wool, flax, hemp and madder, which were useful in the manufacture and dyeing of wearing apparel; and, on the other hand, the inhabitants seemed to be endowed with special dispositions for this trade. At first, the artisan practised the spinning of wool and flax and the weaving of cloth and linen, in their primitive forms, for his own needs alone. As late as the twelfth century, this was the only form under which the textile industry displayed itself in the towns and especially in the country.

The population filled up its leisure with weaving and spinning in those districts, more particularly, where agriculture was not very productive and employed but little labour. In this way, people began to produce more than they wanted for their personal requirements and sought to dispose of the surplus. This state of things gave birth in many places to the "cloth marts," of which the traces are still seen in the present markets of Zutphen and Bois-le-Duc, although these markets have lost their original importance.

At first, the production was wholly absorbed by the local needs, but, in the second half of the fourteenth century, people began to apply themselves to the export trade. In this way, a cloth industry was set up in the privileged towns, which not only attracted an influx of new inhabitants and brought progress and prosperity to the cities, but also earned for the country a fame that spread beyond the frontiers.

Thanks to the rapid advance in technical methods, it was able to compete on the foreign markets, while, by a strict system of division of labour, it constituted a special factor in the economic life of those days.

Linen-weaving, on the other hand, was far less centred in the towns. The industry did not become very important in any of the cities except Haarlem. Everywhere else, it remained a domestic industry.

At the same time, wool-weaving did not entirely disappear in the rural districts, in spite of the efforts made by the towns (with the support of the Central Government, which was interested from the fiscal point of view) to prevent its development by prohibitive arrangements and other measures of an artificial character. All over the country, and principally in those parts where sheep were largely bred, the woollen industry continued in the form of carding, spinning and weaving establishments.

Moreover, the interference of the authorities and the regulations enforced in the cloth industry in many of the towns in Holland drove the manufacturers to other parts where they were allowed more liberty, especially to North Brabant, where the industry in the country districts was less hampered by rules and restrictions than in Holland. In this way, the cloth merchants who settled at Tilburg, Oosterwyk and other places in this province, laid the foundations of the wool trade which later attained such large proportions.

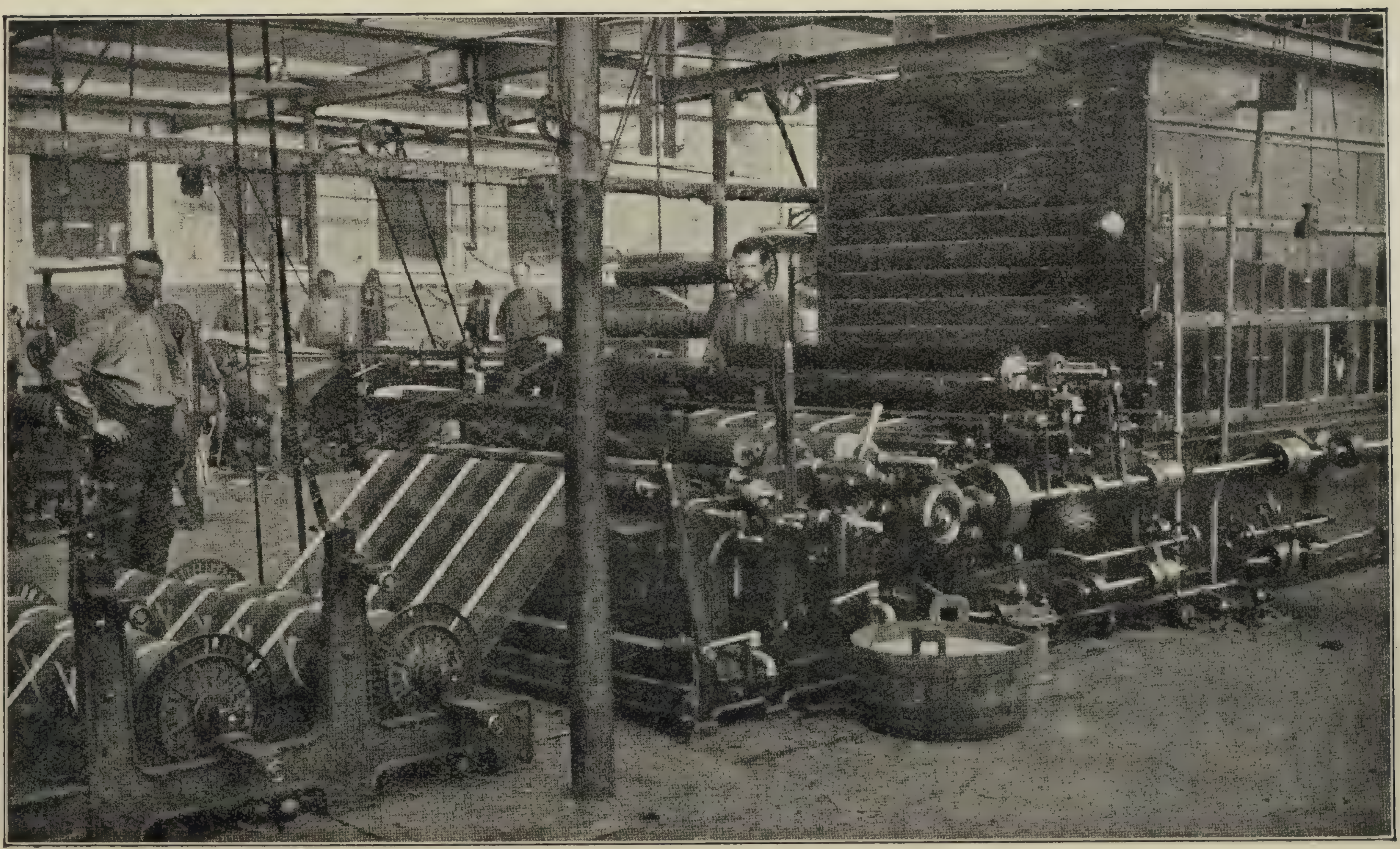
When the Republic of the United Provinces was at its zenith, there resulted a period of renascence for the textile industry, which, in the first place, benefited by the immigration of the numerous foreign refugees who transferred their industry and their arts to this country. When the southern provinces were occupied by the Spanish troops, a large section of the woollen manufacturers of the cities of Flanders and Brabant settled at Leyden and other towns in Holland, where they brought the results of the progress already effected elsewhere.

The linen industry also experienced this foreign influence. Many weavers and traders from abroad settled at Haarlem and Amsterdam and also in Twente, which, at that time, was one of those isolated districts where the population still occupied its leisure in spinning and weaving. The immigrants in question established themselves as manufacturers. They supplied the peasants with yarn and bought their linen, which they exported everywhere. They had deliberately chosen Twente as their residence, this district, although very remote, lying on the direct road between Amsterdam and Northern Germany, a favourable position for the sale. Moreover, the population knew the trade thoroughly and, thanks to its simple habits, was satisfied with low wages. True, those Flemish refugees little suspected that these modest beginnings would, one day, give birth to the textile industry of Twente, which was destined, in its turn, to take the lead in the great industry of the Netherlands and to achieve a world-wide renown by turning the "Achterhoek van Overijssel" (the extreme end of the province), until then a lonely and backward district, into a centre of traffic, movement, prosperity, development and progress.

The beginning of the nineteenth century saw the end of the period during which the textile industry left the towns and transferred itself to three very clearly defined rural centres. It seems, therefore, only natural that we should take this period as our starting-point in describing the development of the different branches of the textile industry.

THE COTTON INDUSTRY.

Cotton manufacture was introduced into The Netherlands at the beginning of the eighteenth century. Before that period, the textile industry of Twente produced nothing but



Warp-sizing Room in a Striped Cotton Factory at Hengelo.

linen. It was not until 1728 that they began to manufacture fabrics which were half linen, half cotton (dimity), cotton being still very expensive at that time. The women spun, in the so-called "spinhuezen", while the men wove, in the "fabricqhüezen".

Linen long remained the principal product; but, in 1795, cotton, which had become cheaper, took the lead. The linen industry began to fall off from 1814 onwards, and ceased entirely in Twente about the middle of the nineteenth century.

The Netherlands, at the middle of the eighteenth century, acted as a pioneer in the cotton industry and also as an instructor of the English industry; and Amsterdam was the great cotton market for the Continent until the early years of the nineteenth century.

The cotton employed in the manufacture of dimity came from the Levant, Egypt and America. The industry worked for the Netherlands market and also, on a modest scale, for export.

During the stirring times from 1795 to 1830, the budding textile industry of Twente passed, turn and turn about, through hard and prosperous times.

The "Nederlandsche Handel-Maatschappij" (Netherlands Trading Company), which was founded in 1824 with the assistance and under the guarantee of H. M. King William I, and had, as its chief object, the facilitating of the Netherlands trade with the Netherlands East Indies, decided to establish a weavers' school at Goor, to teach the use of the new bobbin-loom.

The management was entrusted to Thomas Ainsworth, the son of a Lancashire manufacturer of cotton goods, who started work on the 1st. of June, 1833. The school, which began by teaching a few expert workmen how to handle the new apparatus and training them as instructors, also worked as a factory. The young workmen were credited with a certain sum for each piece produced; and the money thus earned was set aside to assist them to buy a loom on leaving school.

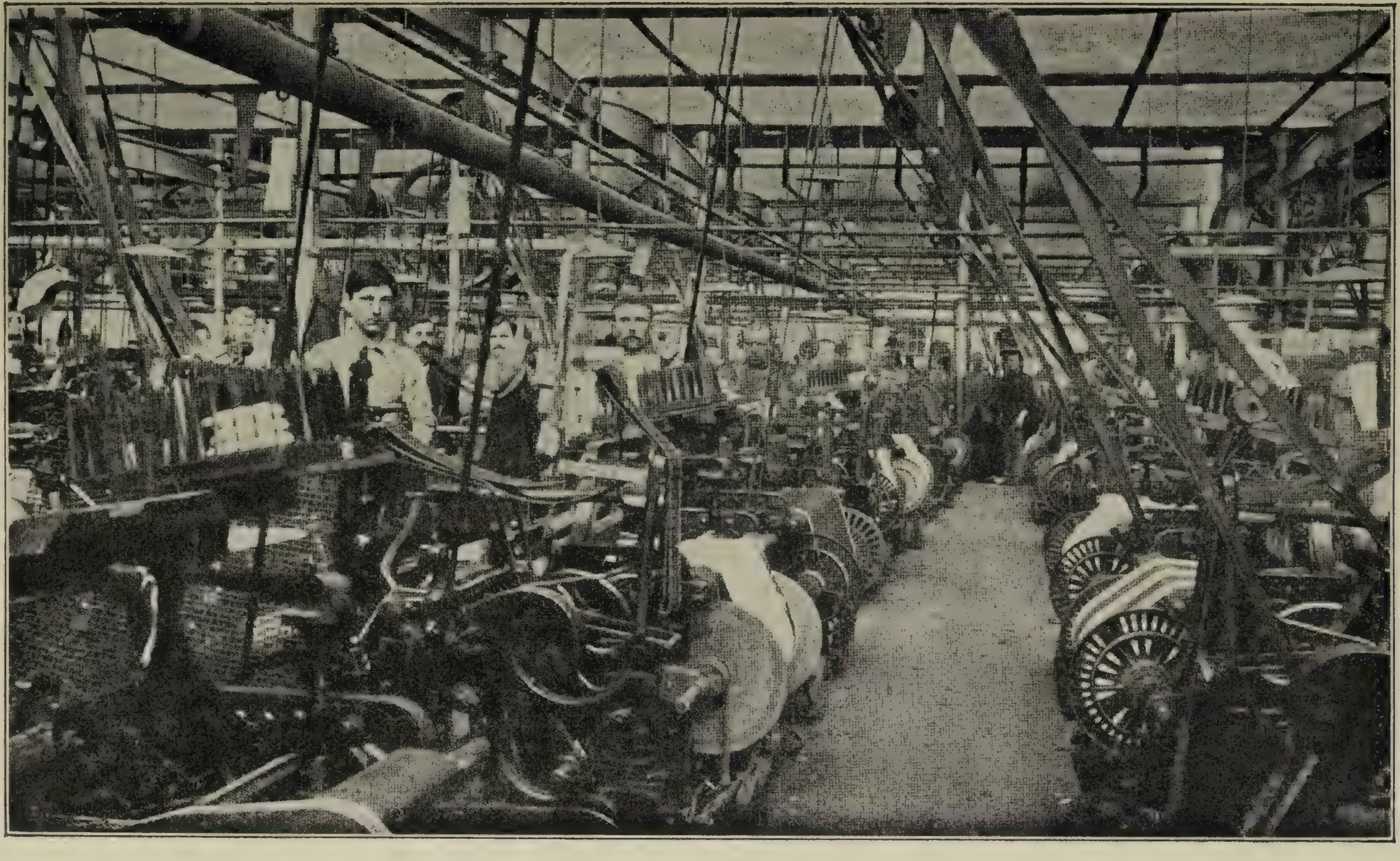
In this way, they were enabled to make use at home of the teaching which they had received; and the object of the

Netherlands Trading Company was attained. In addition to Goor, weaving schools were founded at other places in Twente, all of which were continued until 1836. In that year, the Company closed them, the new method being now sufficiently known. The action of the Netherlands Trading Company had called attention to the practical improvements to be made, and had, as its immediate result, increased the prosperity of Twente. As early as 1836, over 400,000 pieces of calico, each measuring 33 ells, were woven in the district; and the exports already amounted to 3,000,000 guilders. The Trading Company gave quarterly orders to any one willing to follow the trade of a weaver, the orders to be delivered to the agency which it had set up at Nyverdal, and assisted the weavers either by advancing them money or by ensuring them a regular custom. It was in a position to do so, being itself guaranteed by Government against eventual losses.

The Twente industry did not make progress in all respects, however, during those years. The manufacturers, relying entirely upon the Trading Company, which only asked for the coarser fabrics, made no attempt to keep themselves informed of the taste of the Indian buyers and omitted to produce the finer articles in request in the East. It was not until 1850, when the Trading Company began to withdraw and to leave more initiative to the manufacturers (an initiative which these were well able to display) that the cotton industry began to develop in that direction, and this prosperity increased as the economic conditions became more favourable to the expansion of the industry. Means of communication improved: the Overyssel Canal was dug, allowing boats to push to the very heart of industrial Twente; and the import duties on raw cotton were abolished.

It was now also that steam, which had first been applied in Twente in 1829, began to be generally employed.

In the aforesaid year, the first steam spinning mill was founded at Almelo, working with 10,000 spindles. In 1843, there were 9 in The Netherlands, in addition to 64 smaller establishments where spinning was done by hand. But many years elapsed before mechanical weaving was introduced. It



The Weavers' Looms in a Striped Cotton Factory at Hengelo.

was not until 1852 — 23 years after the erection of the first steam spinning mill — that they began to build the first steam factory in Twente. This factory, working originally with 360 power-looms, was established at Nyverdal. It was soon considerably enlarged, whereupon others followed in its footsteps.

The cotton industry next expanded by dint of its own strength. In 1861, there were 10 steam spinning mills in Twente, with 41,000 spindles, and in 1867, 18, with 162,150 spindles. In 1861, the number of steam weaving establishments amounted to 13, with 2,286 looms; in 1867, to 34, with 7,960 looms.

The abolition of different excise duties, especially that on fuel in 1863, also had its influence upon this extension.

On the 1st. of January, 1866, the import duty on cotton goods in the Netherlands East Indies was reduced to 20 % on foreign goods and 10 % on goods bearing a certificate of Netherlands origin. On the 1st of January, 1868, these duties were limited to 16 % and 10 % respectively. The Twente manufactures, who, before this reform, were more particularly given to exporting to Java, strove thenceforth to find an outlet upon other markets.

They increased their efforts still further in 1874, a year full of consequences for the Twente industry, when the differential dues in the Netherlands East Indies were completely abolished and replaced by a single duty of 6 % upon all manufactured products, whether Netherlands or foreign. The Netherlands industry, which could now no longer rely exclusively upon its exports to the East Indies, began to produce goods for the markets of the world. At the same time, foreign competition, especially that of Lancashire, acted as a stimulant upon the manufacturers and compelled them to constantly improve their plant from the technical point of view

Thenceforward, a period of great development set in, as is clearly shown by the following statistics. In 1887, the number of steam spinning mills was 12, with 204,000 spindles. In 1898, the latter figure had increased to 232,446. Between 1867 and 1887, the number of looms increased by 66 %.

In this last year, the number of steam weaving factories amounted to 37, with 13,397 looms; in 1897, the latter figure had increased to 18,698.

If we take the next 16 years and compare the figures for 1913 with those for 1897, we see fresh evidence of striking progress, the number of steam cotton mills in Twente amounting, in 1913, to 13, with about 550,000 spindles and a total number of about 7,000 hands. Enschedé boasted most of these establishments, that is to say, 8 spinning-mills with about 5,000 hands. The towns of Almelo, Hengelo, Oldenzaal, Lonneker and Borne possessed one apiece. Most of these factories are run in conjunction with steam weaving establishments. Outside Twente, The Netherlands contain only one cotton mill, at Veenendaal, in the province of Utrecht, which in 1913 worked with about 900 hands. In 1913, therefore, The Netherlands possessed in all 14 cotton-spinning mills, employing about 9,000 hands.

The 14 cotton-spinning mills in The Netherlands are not enough for the needs of the weaving factories of the country, although they dispose of the greater part of their output to them, the other Netherlands industries that employ cotton and, last of all, foreign countries (Germany, in particular) receiving only a small quantity. The importation of cotton yarn has therefore constantly increased. In the case of untwisted, undyed yarn especially, the imports greatly exceed the exports, the difference, in 1913, amounting to 37,447,000 kilograms. This yarn is mainly supplied by England.

As a result of what we have already said concerning the cotton-spinning mills, the cotton-weaving industry in The Netherlands has increased on a larger scale than the spinning mills, which, with the single exception mentioned above, are confined to the district of Twente. Cotton-weaving, in fact, has also sprung into life and vigour in the east of the province of Gelderland, which adjoins the industrial centre of Twente, and in the south-eastern portion of North Brabant (the old bailiwick of Bois-le-Duc), where it is often combined with other branches of the textile industry, such as linen and wool-weaving. At Helmond, the centre of the Brabant cotton industry, this industry also dates back to 1830 or thereabouts.

Here, under the encouragement of the Netherlands Trading Company, coloured stuffs were manufactured with hand looms, wholesale, for export, even at that date. The Helmond manufactures produced principally sarongs (native garments), kains and kerchiefs for our Indian possessions; and the Netherlands Trading Company undertook the carriage and sale of such goods.

When the Company began to interest itself less in this agency than it had in the past, the Brabant looms proceeded to work for the Netherlands market. In 1870, there were still some hundreds of workmen at and around Helmond who worked at home for the manufacturers' account and received the raw material from them. The weight of the fabrics delivered was checked when the wages were paid. For that matter, the small growers throughout the district, and especially in the villages, practised hand-weaving. The men wove and the women and children reeled the thread. It was not until after 1870 that all the Brabant weaving establishments began to work by machinery. We will here enumerate the cotton-weaving factories actually working in The Netherlands:

In Twente:	Factories.	Hands (about).
Almelo and neighborhood	5	3,000
Enschede and Lonneker	14	3,600
Hengelo	4	3,000
Delden	2	150
Goor	1	600
Oldenzaal	3	350
Nyverdal	1	1,600
Friezenveen	1	700
Haaksbergen	2	400
Total....	33	13,400

In Gelderland:	Factories.	Hands (about).
Aalten	4	150
Neede	2	500
Winterswyk	5	700
Groenlo	2	50
Total....	13	1,400
In North Brabant:		
Eindhoven	3	500
Helmond	9	1,500
Total....	12	2,000
In other Provinces:		
Leyden	1	550
Deventer	1	450
Total....	2	1 000

In all, therefore, The Netherlands contain 60 cotton-weaving factories, employing about 17,800 hands. In the above tables, we have mentioned only those factories engaged exclusively in weaving.

Nearly all have workshops attached for *printing, bleaching, dressing* and *dyeing*. The cotton factories in the south-east of North Brabant produce, for the most part, only coloured goods, while those at Hengelo manufacture nothing else.

At a village in Brabant called Gemert and in the neighborhood, there are still 180 workmen who make cotton goods by hand. The old home industry has therefore not entirely disappeared in that part of the country.

The factories that turn out cottons together with linens or woollen goods and sometimes with both, form a fairly important group of textile establishments, apart from the cotton-weaving factories proper. Ootmarsum, for instance, has 1 factory of damask, linen and cotton; Groenlo, 1 factory of linen and cotton; Neede, two factories of linen and cotton stuffs; Veenendaal, 1 factory of cotton and linen; Boxtel, 2 factories of cotton and linen; Eindhoven, 3 of these factories and Helmond 1 factory of coloured stuffs and drawers.

Generally speaking, the dressing industry (bleaching, dyeing and printing-works), which plays so great a part in the textile industry, has developed together with the extension of the cotton industry. In 1836, THOMAS AINSWORTH, with the financial support of the Netherlands Trading Company, founded the first steam bleaching works at Goor.

Dyeing and printing made considerable progress in the second half of the nineteenth century; and dressing more and more took the place that belonged to it, thanks to the great technical progress made.

The following are the figures relating to special dressing establishments now in working: Beek and Donk, 1 factory for steam dyeing and bleaching of cotton thread; Almelo, 1 bleaching factory; Eibergen, 1 steam bleaching factory and dressing establishment; Enschede, 1 dyeing and printing factory; Goirle, 2 blue dyeing factories; Goor, 1 steam bleaching factory; Haarlem, 1 cotton-printing and dyeing factory; Helmond, 1 cotton-printing and dyeing factory, 3 establishments for dyeing thread Turkey red (one of these establishments is also a dyeing-works and dressing establishment); Hilversum, 1 establishment for dyeing thread; Lonneker, 1 steam bleaching factory; Oldenzaal, 1 cotton-dyeing factory; Rotterdam, 1 cotton-printing, bleaching and dressing establishment.

In addition to the spinning mills, weaving factories and dressing establishments, there are a number of factories all over the country which turn raw cotton, cotton-waste or cotton yarn into different articles, but which do not come within any of the three above-mentioned categories and do not either belong to one of the branches of textile industry employing different materials, including cotton, of which we shall speak later. The chief of these establishments are: 2 candle-wick factories at Gouda; 1 factory of fishing-nets, knitting-cotton and candle-wicks at Leyden; 1 factory of twisted thread at Enschedé; 14 factories of purified cotton-waste, including 2 at Almelo, 1 at Apeldoorn, 2 at Arnhem, 4 at Enschedé, 1 at Groenlo, 1 at Haaksbergen, 1 at Hengelo, and 2 at Oldenzaal; and 4 establishments for winding cotton thread at Geldrop, Someren and Weert. Moreover, we find in Twente a few factories of carding-combs and sticks for cleaning cotton, for sorting cottons, etc.

The following figures give a notion of the development of the cotton industry and the importance of the trade in its products. It shows that The Netherlands export a great many more cotton goods than they import, and that the increase in the exports much exceeds that in the imports.

IMPORTS AND EXPORTS OF EVERY SORT OF TEXTILE FABRIC AND, SEPARATELY, OF COTTON FABRICS, FROM 1867 TO 1913

(in thousands of guilders) *

Years.	Imports Every sort of textile fabric	Imports Cotton fabrics only	Exports Every sort of textile fabric	Exports Cotton fabrics only
1867—76	31,766	10,566	22,982	17,782
1877—86	27,871	9,836	26,773	16,702
1887—96	24,260	9,700	40,356	30,342
1897—1906	40,704	14.914	57,257	39,071
1907	46,100	16,880	71,998	52.609
1908	43,942	16,466	74,708	53,380
1909	47,111	17,284	80,384	58,164
1910	48.026	17,531	89,053	59,856
1911	48,404	18,128	91.617	65,263
1912	51,370	18 311	103,900	74,096
1913	61,636	27,145	115,107	76,731

* 1 guilder = 1 *s.* 8 *d.*

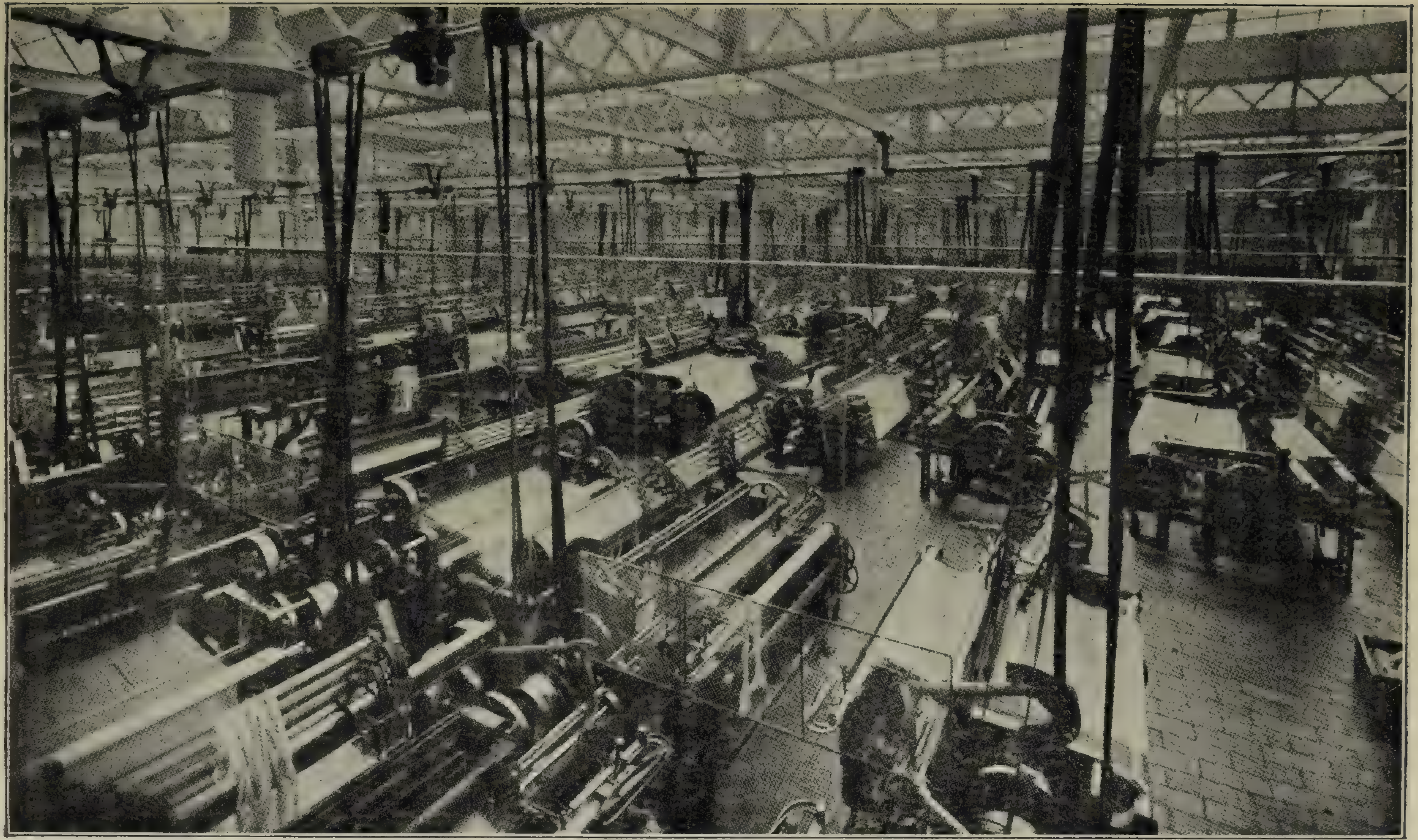
The cotton goods are exported every year to every country in the world, but chiefly to the Netherlands East Indies, British India, China, Japan, South America, Africa, Australia and the Balkan States.

In the first half of the nineteenth century, the woollen industry was centred mainly at Tilburg and in a few other places in the south-east of North Brabant. Outside that province, only Leyden, thanks to the important factories of fine woollen stuffs, blankets and sayette (or knitting wool) which the old city possesses to this day, is able to perpetuate the memory of its ancient cloth trade, famous in centuries past. For the rest, we find but few traces of that industry, even at places where other branches of the textile industry are carried on, such as Veenendaal, in the province of Utrecht, and Twente.

The woollen industry in The Netherlands, which was only comparatively prosperous before 1860, began to spring into vigour some time after that date. This was especially the case with the Tilburg factories, which knew how to profit by the disappearance of the obstacles that had long delayed their development and also by the improvement in the means of communication and the bigger ideas that began to arise in industrial matters.

Formerly, for instance, the manufacturers had confined themselves almost exclusively to making cloth, sayette and baize. After 1862, on the other hand, a few young men endowed with powers of initiative, the sons of Tilburg manufacturers, realized that it was incumbent upon them to acquaint themselves with the progress of their time. They therefore went abroad, where they worked as ordinary artisans in the factories at Verviers, Aix la-Chapelle, etc., and learned the manufacture of fancy stuffs. On returning to their native town, they started factories for the production of these stuffs, which factories became very prosperous in spite of having sometimes to cope with periods of crisis.

Even as with the cotton industries, the woollen industries may be divided into four categories: (1) the establishments which only spin wool, washed and combed in the establishment, or otherwise; (2) those which do not spin, but exclusively manufacture fabrics or other products with the threads; (3) the establishments which combine the three



The Looms in a Flannel Factory at Tilburg.

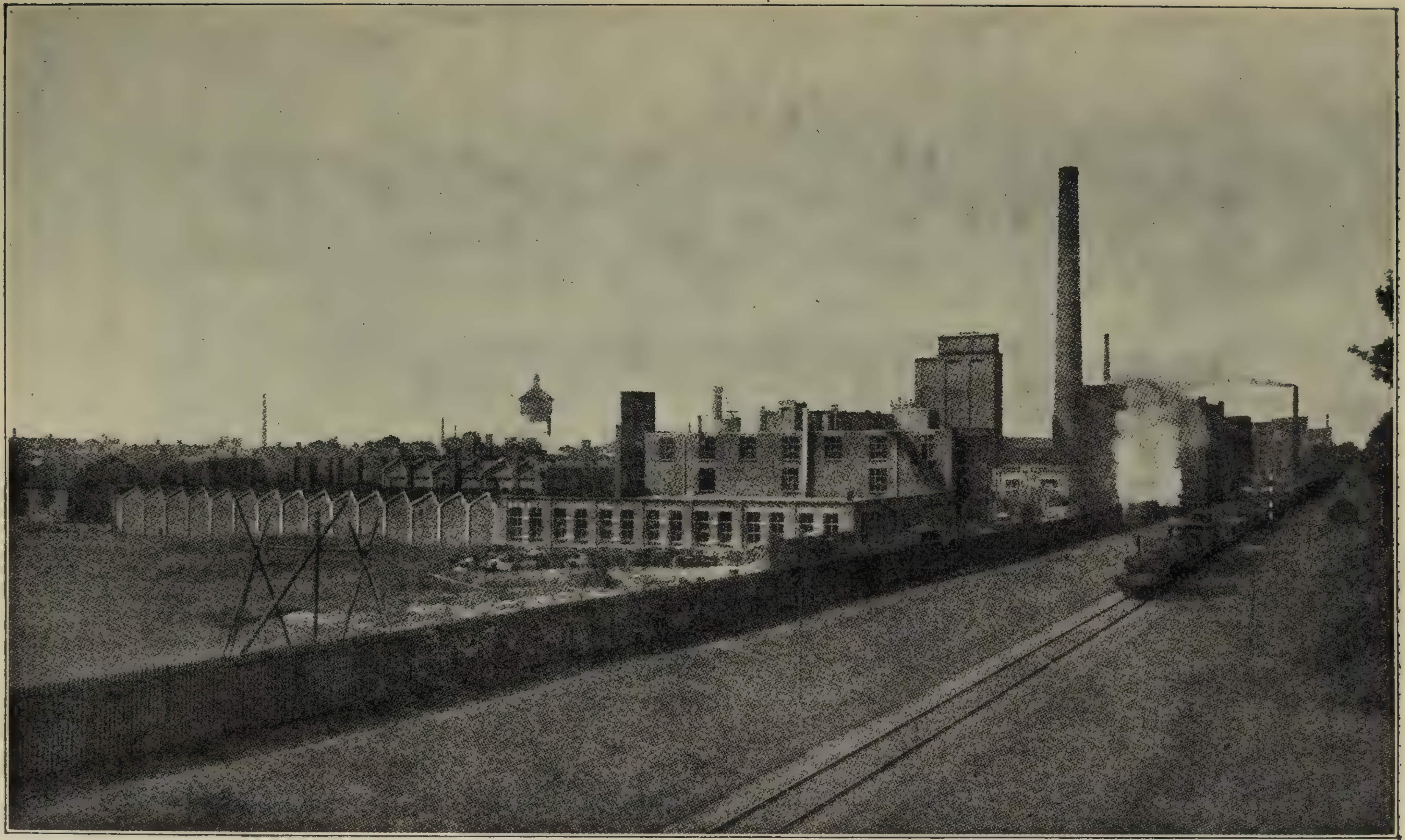
principal branches of the industry (spinning, weaving and dressing), representing the phases through which the raw material passes before becoming an article of sale; and (4) the independent establishment in which the articles are finished. The most numerous class of establishments is that in which the spinning, weaving and dressing is combined. These factories are found mainly at Tilburg.

Spinning mills, which supply the weaving factories with plain threads and the trade with knitting-wool or sayette, are established at Tilburg (3), Veenendaal (2), Bolsward (1) and Diever (1). The Bolsward and Veenendaal mills make combed wool, which is twisted into sayette; the Tilburg and Diever mills make carded wool. The latter work mainly for the weaving factories. Leyden has 4 sayette mills; two of them are combined with workshops for the manufacture of stockings by machinery, one with a similar workshop and a blanket factory and two with a factory of linsey-woolsey, bunting, camlet and serge. Veenendaal also has a sayette factory, in which stockings are made by machinery.

The wool of the North Holland sheep and oversea wool form the raw materials for the spinners of knitting-wool and sayette, who wash and card it themselves. They sell their products for the most part in The Netherlands. Some of them, however, have a market abroad, chiefly in Germany, Switzerland and the Levant.

All the establishments in which articles of mixed wool and cotton are manufactured out of pure wool, wool-waste and artificial wool (there are 2 factories of this last article at Tilburg and 1 at Terheyden) may be classed in the category of factories of woollen fabrics. There are 60 of them in The Netherlands, of which 45 are at Tilburg, 3 at Eindhoven, 4 at Geldrop, 1 at Stratum, 3 at Leyden, 1 at Almelo, 2 at Delden and 1 at Hengelo. Among the 45 Tilburg factories are 3 which only weave and dress the wool.

All the others have their own spinning mills; some have also their own washing houses. Those which have no washing houses send the oversea "greasy" wool to be washed in special washing houses. There are two of these



View of a Bedclothes Factory at Enschedé.

at Tilburg, owned and run by importers of oversea wool.

Of the three factories of woollen goods at Leyden, two produce bunting, linsey-woolsey, camlet and sagathy, and one has long specialized in the manufacture of fine cloths and is fitted with complete installations for washing, spinning, weaving, dressing and dyeing. The Almelo factory also possesses a washing house, a carding house, a spinning mill, a weaving establishment, a dye-works and a dressing works; the Hengelo factory only a weaving establishment and a dressing works.

There are not many independent establishments for finishing woollen goods in The Netherlands, most of the woollen manufactures doing their own finishing and dyeing as secondary trades. Nevertheless, there are 8 wool-dyeing establishments at Tilburg, employing about 125 hands, and 3 dyeing works for manufactured stuffs and 1 dyeing factory for sagathy at Leyden and 2 dyeing works for thread.

Most of the Netherlands woollen manufacturers produce a large number of different stuffs, cheviots as well as combed cloths, buckskins and cashmeres as well as swanskins, flannels and mousseline-de-laine. Only a few devote themselves specially to the manufacture of a single article, such as ordinary cloth or cloth for uniforms.

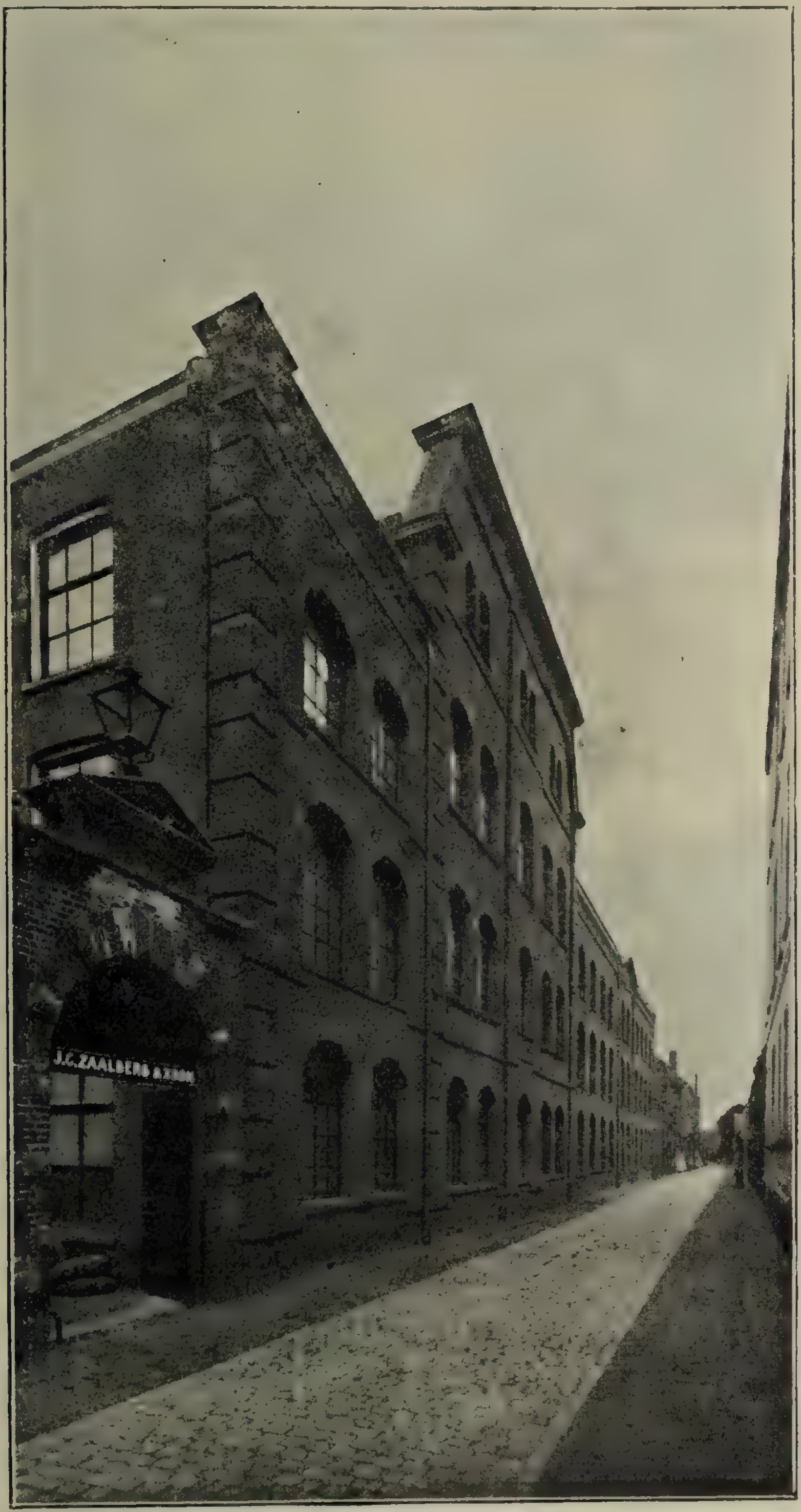
The Netherlands statistics give the following figures (special trade) for the exports in 1913: 5,182,000 guilders' worth of cloth, buckskin and cashmere; flannel and swanskin to a value of 211,000 guilders, and "other woollen goods" to an amount of 20,454,000 guilders.

It is estimated that this quantity forms nearly half of the total production, which therefore amounts to a value of about 51,600,000 guilders (about £ 4,300,000).

Netherlands woollen goods are exported to the United Kingdom, Belgium, France, Switzerland, Denmark, Austria, Norway, Turkey, China, Japan, Australia and South America, Canada and South Africa.

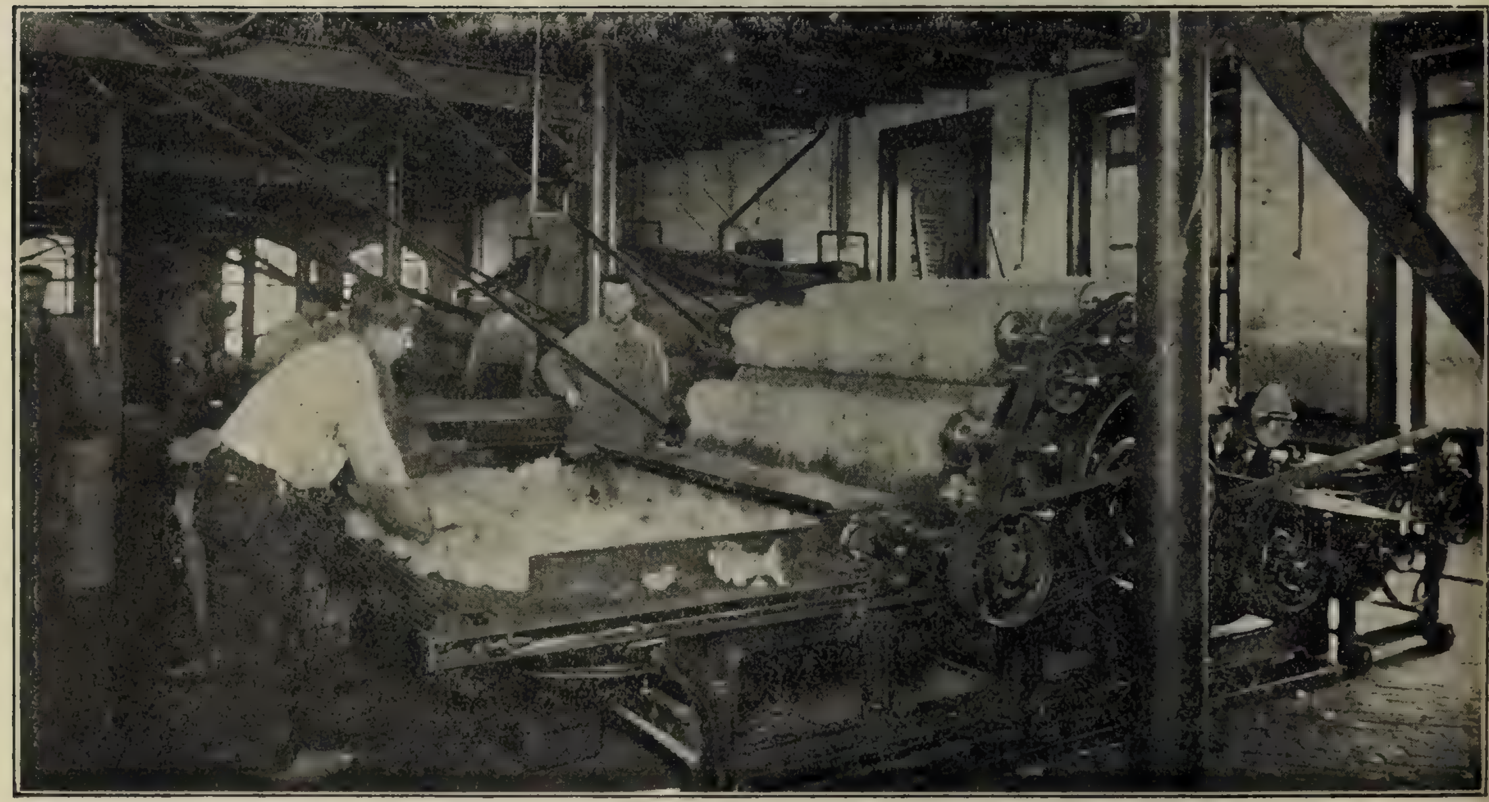
Three factories of Utrecht velvet, of which 2 are at Eindhoven and 1 at Hengelo, employing about 100 workmen in all, may also be classed among the establishments of the woollen industry. This industry, which has improved of

THE MANUFACTURE OF BLANKETS
A SERIES OF VIEWS OF A LEYDEN FACTORY

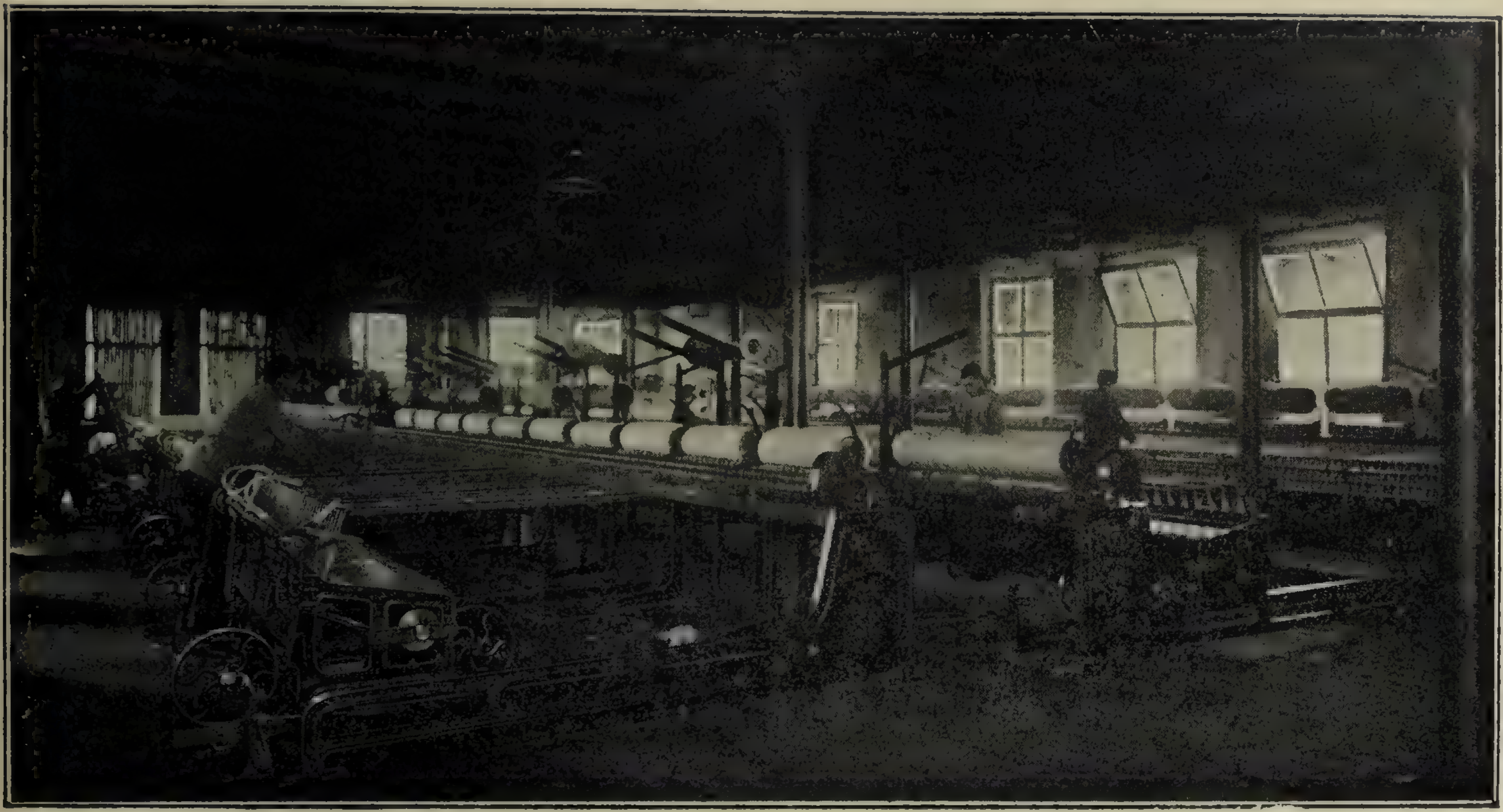


1. The Factory from the Outside.

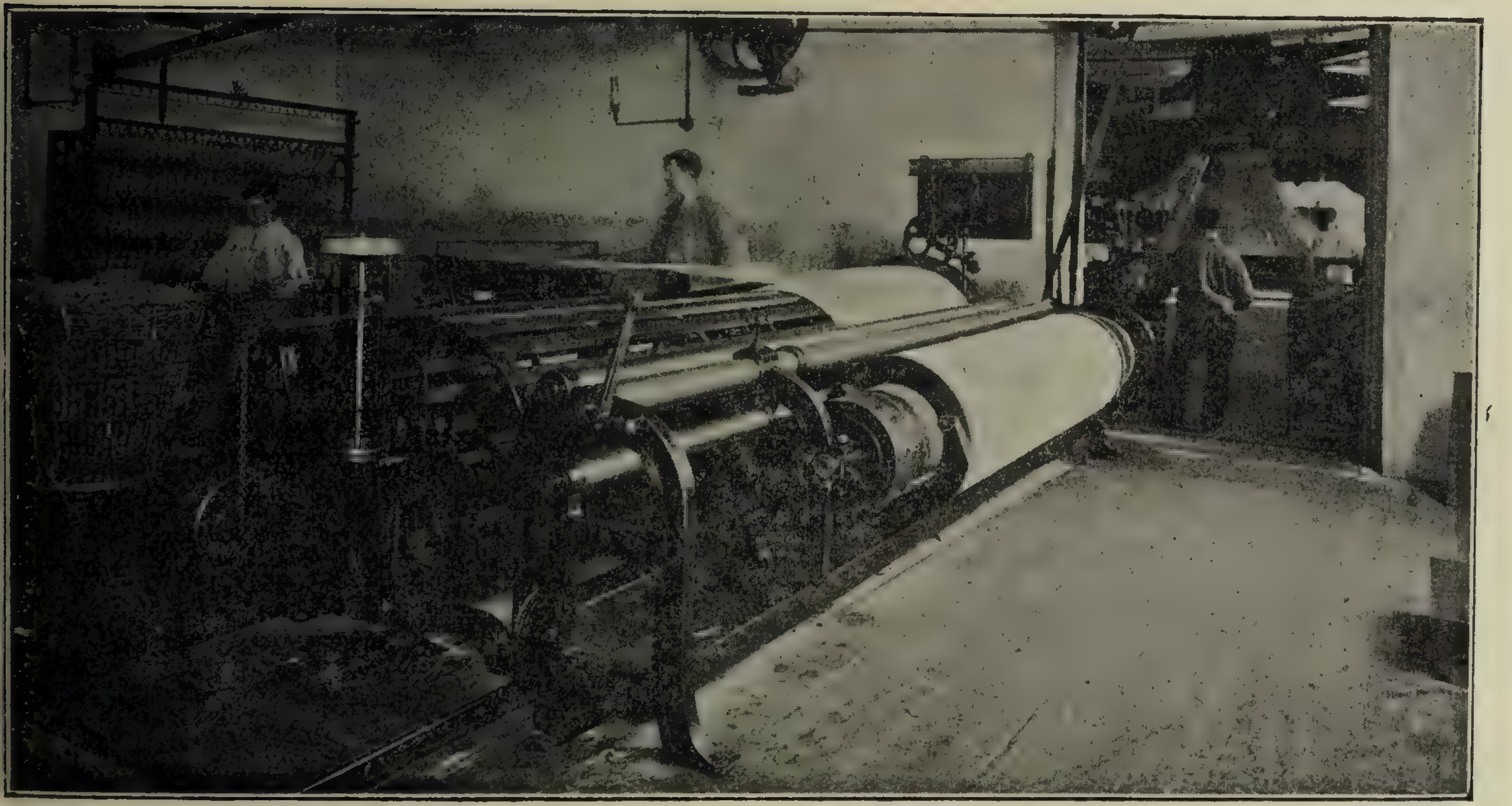
2. Sorting the Raw Wool.



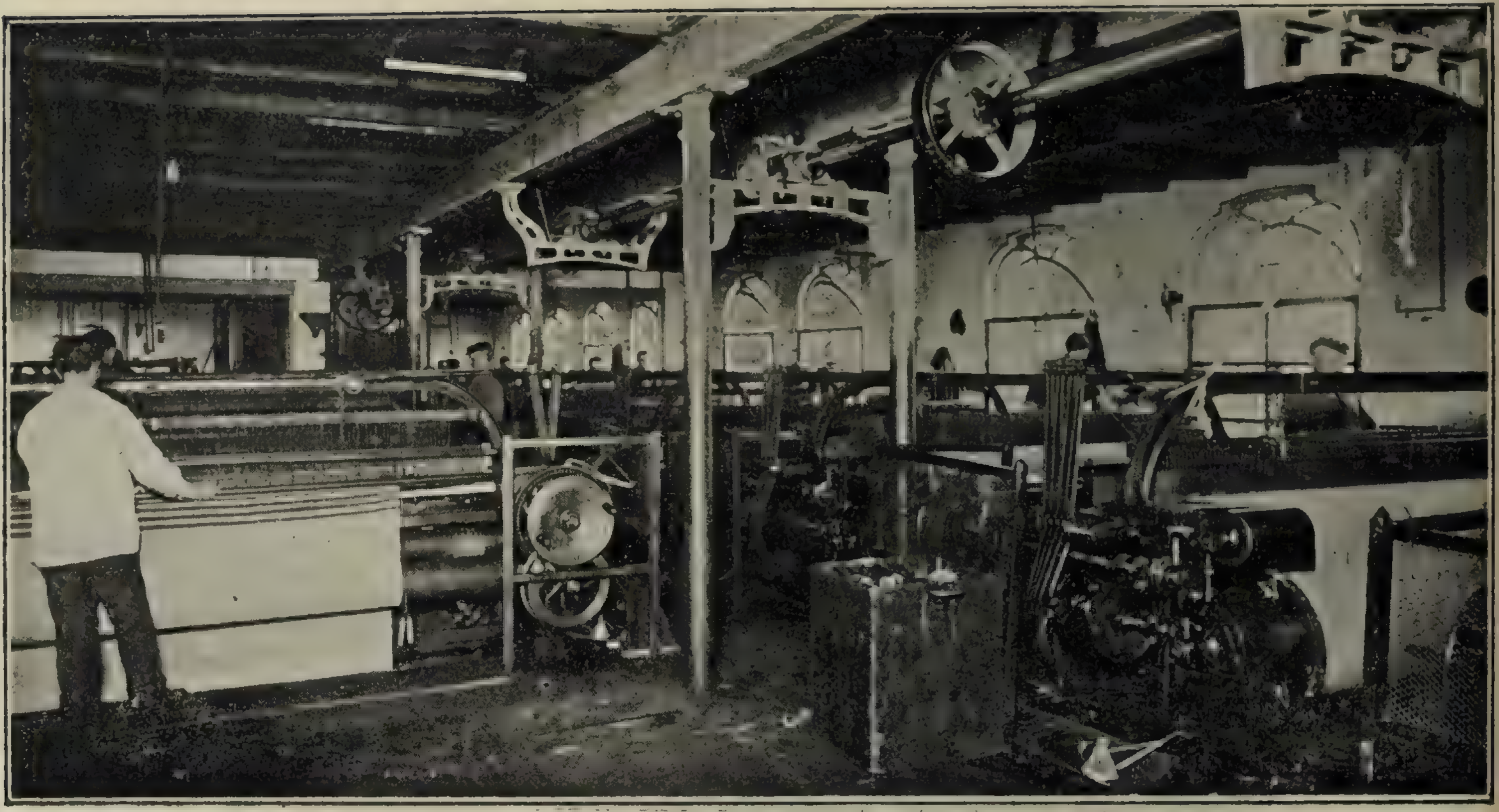
3. Spinning-house: the Carding Machines.



4. Spinning-house: the Self-acting Machines.



5. Constructing the Warp.



6. The Weaving-room.

7. The Jacquard Weaving-room.

8. The Fulling-mill.

9. Washing and Carding the Blankets.

10. The Sulphuring Stores.

11. The Packing-room.

late years and which strives to supply strong and tasteful goods, has an undoubted future before it.

THE LINEN INDUSTRY.

The linen industry was supplanted by the cotton industry in Twente at the beginning of the nineteenth century, and is now almost entirely relegated to the south-eastern portion of North Brabant, round Eindhoven and Boxtel. In 1874, the district contained no fewer than 1,300 linen weavers. The industry was practised for the greater part at home. Even today, home work plays an important part in this region, although the number of weavers working indoors has decreased greatly during the past 25 years. At present, there are 24 linen factories fitted with machine-looms and employing their workmen (about 1,400) almost exclusively in their workshops. Next come a good number of hand-weaving factories, whose workshops are occupied only by the workmen who make damask and fine table-linen, whereas ordinary linen is manufactured in the workers' homes. Lastly, there are some hundreds of weavers, men and women, who, in winter, when agriculture is at a standstill on the sandy soils, sit down to their looms and make (either for their own account or for that of the retailers) linen or half-linen, which is carried to market or peddled.

Consequently, this industry, which is seen simultaneously under different forms, is organized otherwise than the cotton and woollen industries. As for the raw material, it is worthy of note that The Netherlands, which occupy a prominent place among the flax-growing countries, send the greater part of their produce abroad, half of this produce being in the raw state. The mechanical spinning of flax thread does not prosper in The Netherlands, although at one time the spinning-wheel was in universal use in the country districts. Most of the weaving establishments therefore import their flax yarn from abroad. There is a very limited number of manufacturers who spin the thread for their own requirements in their weaving factories.

Over and above the 24 machine-weaving establishments, there are many hand-weaving establishments of some importance. They are found at Aalst, Alphen-and-Riel, Boekel, Boxtel, Eindhoven, Geldrop, Gemert, Gestel, Goirle, Mierlo, Nunen, Oerle, Someren, Stratum, Strijp, Tongelre, Veghel, Veldhoven, Vessem, Waalre and Zeelst and, outside Brabant, 1 at Almelo and 1 at Groenlo. This list does not include the factories already mentioned in the section dealing with the cotton industry, which make linens as well as cotton and woollen goods. There are also in Brabant some 260 linen weavers who work at home, including 125 at Nunen. Oldenzaal has a hand-weaving establishment of linen and jute stuffs, employing about 75 hands; and Goirle has 2 weaving establishments of linen, cotton and jute, with a total of about 400 hands, who mostly make tapestry cloth.

Like the woollen manufacturers, most of the linen manufacturers themselves undertake the dressing of the stuffs which they weave. They also have their own bleaching works. Teteringen is the only place that has a small independent linen-bleaching factory. In the old days Haarlem was famous for its linen bleacheries.

The linen factories in The Netherlands make chiefly table linen in damask and diapered linen, all sorts of household linen, handkerchiefs (in cambric), ladies' dress materials and tailors' materials. They work for the home trade and for export to the colonies and abroad. The machine-woven linen is more generally exported than the produce of manual labour.

THE JUTE INDUSTRY.

In the course of time, several less extensive branches, which nevertheless possess an importance of their own, have developed side by side with the principal branches of the textile industry, from which they have partly sprung.

Among these, the jute industry deserves our first attention. Before the introduction of jute into Europe, all sorts of packing material were made in The Netherlands and elsewhere, notably sacks and bales, for which canvas of linen and hemp was used. After the separation from Belgium, these were erected, in different towns, such as Oldenzaal, Goor, Enschedé and Ryssen, and in the district known as "the Gooi" factories for weaving canvas bags, which at first worked almost exclusively to fulfil the orders of the Netherlands Trading Company. In 1885, they began to employ as their raw material jute imported from England in the form of threads. The firms that worked this jute were hand weaveries, which have since disappeared or which have been transformed into steam factories. Nevertheless, Ryssen in Twente and Goirle in North Brabant are the only places where jute-weaving expanded. In 1864, the first steam jute-spinning and weaving establishment was founded at Ryssen. The same firm now runs two factories for spinning and weaving and employs some 1,100 workmen. The products of the spinning factory not only supply the need of this firm's weaving factory, but are also sold to other weaving establishments. As already stated under the heading of linens, there are also 3 factories, employing 200 hands, which make different articles out of jute and other materials. These are found at Goirle (2) and The Hague.

The demand for articles made of jute (sacks, stair carpets, table-cloths, curtains, etc.) has constantly increased of late years. The Netherlands manufacturers have a market in their own country and also export on a fairly large scale.

THE BLANKET INDUSTRY.

The industry in bed-clothes is divided into three branches — the manufacture of woollen blankets, of cotton or swanskin sheets and of wadded quilts.

There are 10 blanket factories in The Netherlands: 5 at Leyden, 2 at Tilburg, 2 at Helmond and 1 at Maastricht. Swanskin sheets are made in 3 factories: at Enschedé (at the same time, a cotton-spinning and weaving establishment), Mierlo and Helmond. Wadded quilts are manufactured at Amsterdam, Delden, Enschedé (also a ready-made clothes factory) and Leyden (also a factory of feathers for bedding, down and capoc), in 4 factories employing about 200 hands in all. These three sorts of bed-clothes sell well in The

Netherlands. Moreover, the swanskin sheets are exported on a fairly large scale to the Netherlands and English colonies and to the Levant. The wadded quilts are also sent to the Netherlands West Indies, but in smaller quantities.

FLANNEL.

The Netherlands woollen and cotton weavers also manufacture flannel of wool, cotton or wool and cotton mixed. There are quantities of different kinds sold. The factories which supply this article, and which are situated partly in Twente and partly at Tilburg, Eindhoven, etc., have already been mentioned among the cotton and wool-spinning mills. Cotton flannel is sold, outside the country itself, in the Far East, in Turkey and in the Scandinavian countries.

KNITTING.

The manufacture of knittings, or tricots, constitutes a special branch of the textile industry. An important cotton mill at Friezenveen was the first to take it up, in 1874, with a plant suited to the needs of a great industry. Other factories followed its example later. As we know, tricot is a fabric woven or knitted out of woollen, silk or other yarn by means of "round looms" and "regulating machines". This material, thanks to its elastic and supple qualities, is particularly suited for making clothes, underclothes, gloves, etc. There are special machines for knitting stockings and jerseys, others for shawls, caps, etc. Tricot is distinguished from other stuffs by its woof consisting of loops of one or more threads.

There are 45 knitting factories in The Netherlands, employing about 3,000 hands in all.

The knitted articles are sold not only in The Netherlands and their colonies, but also in British India, China, South Africa and the Levant.

THE CARPET INDUSTRY.

The art of carpet-weaving in The Netherlands dates back to the fifteenth century. It was first practised at Utrecht and forms an important branch of the textile industry.

The carpet industry is centred mainly in the Gooi, the south-eastern part of the province of North Holland, notably at Hilversum and Laren. Of the 35 carpet factories in The Netherlands, 18 employing about 600 hands are at Hilversum and 7, employing about 100 hands, at Laren. Most of them are small establishments which, until a few years ago, still gave out the work to be done at home.

In addition, Deventer has 3 carpet factories, with about 300 hands; Rotterdam, 1, with about 160 hands; and The Hague, 1, with about 60 hands. The province of Utrecht possesses 2 carpet factories, of which 1 is at Rhenen (cocoanut matting), with about 80 hands, and 1 at Amersfoort, with about 80 hands; and Gelderland possesses 1, at Dinxperlo. This last was founded in 1866 at Deventer and removed in 1881 to Dinxperlo, where it consists of two establishments, one on Netherlands territory and the other at a few minutes' distance across the German frontier. Nykerk possesses a factory of cocoanut mats and matting employing about 120 hands. The same articles are also manufactured in several establishments situated at Apeldoorn, Leyden, Moordrecht, Nykerk and Zwartsluis. The Rotterdam carpet factory likewise has a special section for making cocoanut mats and matting; and there is a workshop at Boxmeer, in North Brabant, which employs about 30 hands in knitting and weaving the cocoanut fibre. A jute and linen-weaving establishment at Goirle also makes carpets and floor-rugs.

Three factories, situated at Deventer, Rotterdam and The Hague, manufacture valuable Smyrna carpets after artistic patterns. The Netherlands also produce stair-carpets and drawing-room carpets of the Brussels and Wilton type, notably in the large factory at Deventer, which has a fairly considerable demand for cow-hair carpets. At Deventer, Hilversum and Dinxperlo, they manufacture large quantities of so-called "Belgian" carpets and rugs.

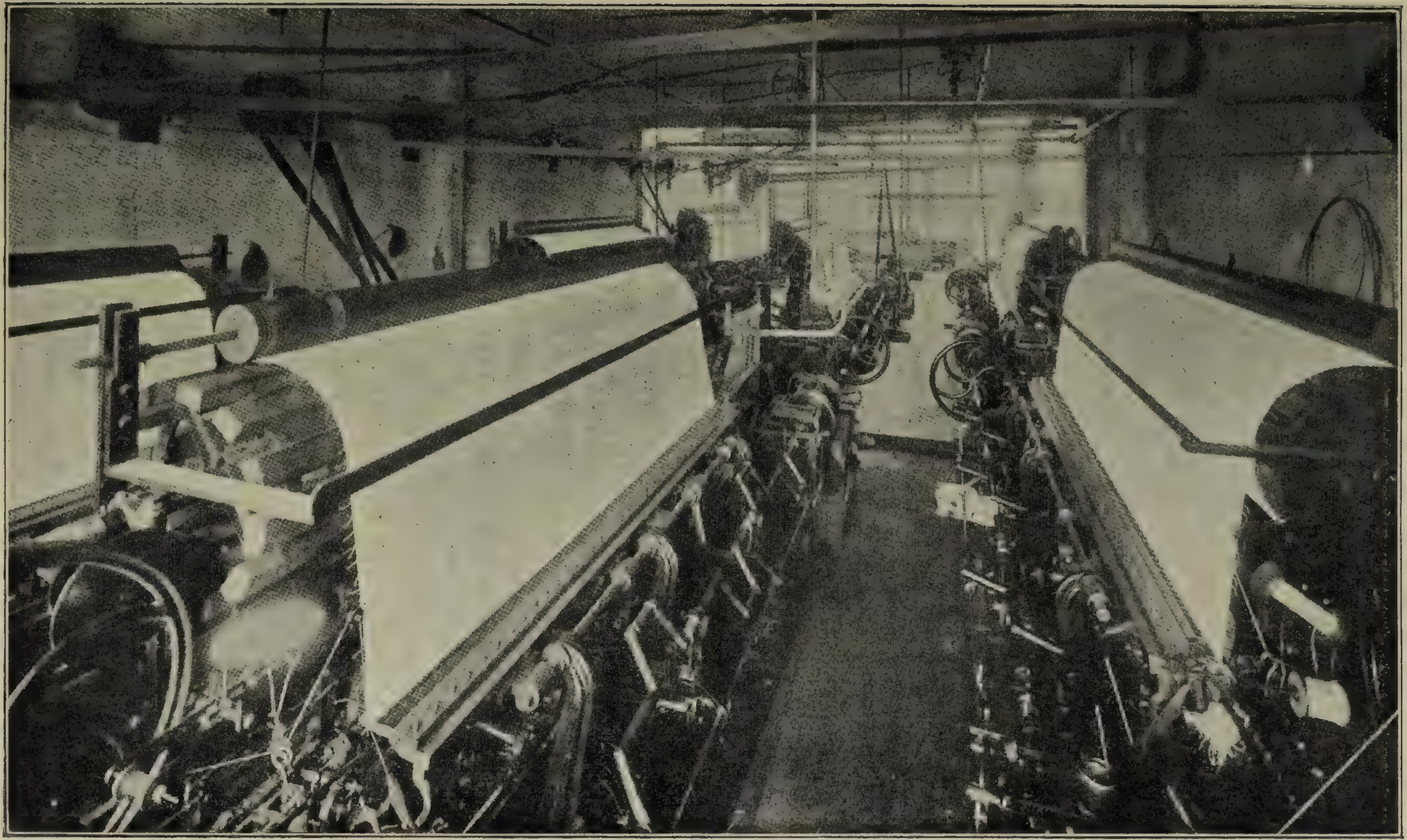
Cheap cow-hair carpets constitute the chief product of the Hilversum and Laren factories. The raw material is mostly purchased abroad, the Tilburg spinning mills supplying only the woollen threads. The cow-hair comes mainly from Great Britain and Germany. The carpet factories sell their goods chiefly in The Netherlands, but the foreign sales also are not without importance. Quantities of cow-hair carpets, for instance, are sold in the Levant.

ROPE-MAKING.

It is only natural that, in a country like The Netherlands, where navigation and the sea-fisheries were the chief sources of prosperity from the start, rope-making should become a very important industry. Large and small rope-yards have existed in all parts since the most remote times. They were most numerous, however, in South Holland, where more hemp is found than elsewhere. There were still 311 rope-yards in The Netherlands in 1874; but different causes have reduced this figure considerably during the last quarter of the nineteenth century. The chief of these causes were the decrease in the demand, owing to the decline in the number of sailing vessels; the concentration of the industry in the large establishments, in consequence of the introduction of manufacture by machinery; and the replacing of ropes by the much stronger steel cables.

There are still, however, about 200 rope-yards, although these include some of the very smallest importance, employing a number of workmen that varies between one and five. The number of large rope-yards at present is 48, employing a total of 1,500 hands, of which 29, with about 1,200 hands, are in South Holland. The largest are situated at Alblasserdam, Bois-le-Duc, Brielle, Edam, Enschedé, Gorinchem, Gouda, Graft, Hoogezand, Lekkerkerk, Maassluis, Meppel, Moordrecht, Rotterdam, Sliedrecht, Sneek, Tilburg, Vlaardingen, Ysselmuiden and Zwolle. About 10 of the largest have their own machine spinning mills. These principally supply the shipping trade, the fisheries and the export trade. The smaller, which work without machinery, sell their products in The Netherlands.

The spinning mills and rope-yards manufacture yarn of Manila, New Zealand and Russian hemp for the requirements of those rope-yards that have no machine spinning mills.



View of the Interior of a Fishing-net Factory at Scheveningen.

They also produce similar hemp threads for agricultural purposes (for binding sheaves) and fine rope and cord: string, twine, trawl-twine, cocoanut-fibre rope, sisal rope, hemp cord, Manila rope, and cord for twisting round iron and steel wire.

All these products find a market not only in The Netherlands and her colonies, but also abroad, notably in England, Germany, Belgium, Denmark, Norway, Sweden and France. Manila and New Zealand hemp yarn are sold in large quantities to the foreign rope-yards, the figure amounting annually to $3^1/_2$ million kilograms.

NET-MAKING.

The manufacture of fishing-nets has, since olden times, constituted a very important trade in this country, which, in the seventeenth century, had a fleet of over 2,000 smacks engaged in the herring fishery. A large number of sea-faring hands were required to satisfy the needs of the fishery; and the nets were mostly made by the old men and the women. This trade continued its existence in The Netherlands longer than anywhere else.

The first fishing-net factory was founded at Scheveningen and was followed by a second at Apeldoorn. The latter, which has grown gradually larger, worked mainly for The Netherlands fisheries until 1899, but, from that year onward, devoted itself to export. At present there are: 1 fishing-net factory at Scheveningen, with about 40 hands; 1 at Apeldoorn, with about 300 hands; 1 at Goor, with about 10 hands; and 1 at Leyden, with about 100 hands. Those at Scheveningen, Goor and Leyden chiefly make nets for the herring fishery in the North Sea; the Apeldoorn factory makes all sorts of fishing-nets and lines, both for the anchovy and sardine fisheries and for the herring and mackerel fisheries. At Sneek, there is a rope-yard which mounts and finishes nets for games as well as for fishing purposes; and there are net works at Maassluis and Katwyk.

In addition to the large factories, there are also smaller ones, where hoop-nets and fishing tackle are made by hand. In some places, this industry is still practised at home, which is also the case with net-mending. The factories that do not do their own spinning purchase their raw materials, that is to say, cotton yarn, which is most used, flax yarn and hemp yarn. The nets are usually sent out bleached, but also sometimes after being greased and oiled in the factories. The fishing-nets are sold not only in the country, but also abroad, being in great request because of their good quality, particularly in Germany and the United Kingdom.

Besides these net factories, there are 90 net-repairing factories with about 1,900 hands.

CANVAS-MAKING.

The manufacture of canvas was formerly an important industry in The Netherlands, Netherlands sail-cloth having always been rightly considered the best. This lasted until the second half of the nineteenth century; but, when the sailing ships were replaced by steamboats, the demand for sail-cloth naturally fell off and caused the industry to decline. The number of canvas factories has decreased particularly since 1870, and the production has followed suit.

Krommenie, The Hague and Hulst, in the province of Zeeland, near the Belgian frontier, may be described as the only places where canvas is still manufactured on a fairly large scale. Krommenie has two factories, employing about 210 workmen, where nearly the whole output is woven by machinery. Only the very heavy sail-cloth is now made by hand, for which reason we still find some 20 home-weavers at Krommenie and in the neighborhood (Assendelft and other villages).

One of these two factories has a separate section for the manufacture of linoleum, which is sold largely in The Netherlands, but which is also exported, particularly to Scandinavia.

Sail factories, which have much in common with the canvas-weaving establishments, are to be found in nearly all the provinces. There are about 60 in all, most of them being small businesses. In addition, there are some 15 more or less important factories of canvas for the sails of windmills and for barn floors, tarpaulins, tents, blinds, rain-proof garments, tarred cloth and other waterproof articles.

THE CAPOC INDUSTRY.

As we know, capoc, known in France by the name of Java down, is a fibrous vegetable matter. It is the flaky seed of the capoc tree, which is found in the wild state in the Netherlands East Indies and the Far East, in the Malay Archipelago, in Central Africa, Central America, and South America.

Capoc is exported on a fairly large scale by the Netherlands East Indies and Java in particular.

The oblong fruit of the capoc tree has a pretty hard shell and a capsule, around which are the seeds covered with woolly flakes. After removing the shell, the capoc is cleaned. This raw material then contains about 34 °/₀ of capoc and 60 °/₀ of seeds and "zest."

It was in this state that the first capoc was imported into The Netherlands from the Netherlands East Indies, about 1850. But the first consignment was not easily placed, seeing that nothing was known of the qualities of this product. Eventually, the early shipments were taken by some bedding merchants. Soon after it had been proved that capoc was a highly elastic material, capable of serving to stuff mattresses, pillows, etc., the first factory was founded at Amsterdam. Here the seeds and other impurities were separated by picking the capoc, or, to use the technical term, it was carded.

It was not until much later, about 1880, that they began to separate the seeds and zest of the capoc in Java, on the scene of its production. This saved no small part of the cost of transport, while the cheapness of native labour greatly lowered the purchase price of the article in a pure state. Since that time, the greater part of the Java produce intended for export is subjected to a first cleaning process and next pressed. Nowadays, the manufacturer in Europe has only to separate by machinery any impurities that remain and to card the capoc, which is then quite ready for sale.

Carded capoc is used for stuffing mattresses, pillows and furniture, for making life-belts (for which capoc is particularly suited, because of its light weight combined with its great volume) and for manufacturing gun-cotton. Hitherto, all efforts to spin capoc have failed, the fibres not appearing to lend themselves to the process.

The first factory for purifying capoc in The Netherlands was founded, as we have said, about 1850 and was soon followed by others. There were five in 1860. Their number increased considerably after 1880. At present, The Netherlands contains 13 capoc factories, employing about 400 workmen in all. Most of them, therefore, are only small establishments; and the majority make bedding, wadding, etc. Lastly, there are a good many buyers (manufacturers of bedding and bed-clothes) who themselves work the capoc, using small carding machines worked by hand.

In 1913 95,138 bales of purified capoc arrived at Amsterdam and Rotterdam. The bale of purified capoc is equal to about 40 kilograms.

THE WEARING APPAREL INDUSTRY.

In The Netherlands, as elsewhere, the industry in wearing apparel is divided into two branches: the making of clothes and underclothing to measure, *i. e.*, to order; and the production, on a large scale, of ready-made garments. The latter branch can be divided into several parts which together compose the "ready-made" trade.

The principal groups are: clothes for men and boys; clothes for workmen and children; garments for ladies and girls; and underclothing.

Several of these articles are made (like the men's clothes made to order and to measure) by tailors working at home and paid by the piece, on account of the large shops, which usually have workshops only for cutting and repairs. Gradually, however, establishments were founded possessing the characteristics of an important industry, where ready-made clothes and underclothes were produced on a large scale. They supplied the retailers, large and small shops alike, with ready-made garments. Up to a few years ago, foreign countries and principally Germany used, so to speak, to flood The Netherlands with these goods; but lately the ready-made industry, especially in certain articles, has developed so largely that the foreign manufactures are being more and more outstripped.

It is hardly possible to give a complete account of the clothing factories in The Netherlands. Consulting the data at our disposal, we find that there are some 51 important establishments, for the manufacturing of clothes for men and boys, employing about 2,000 hands, men and women, and situated chiefly in the towns. The greater number are at Amsterdam (23), Almelo, Arnhem, Bois-le-Duc, Groningen, The Hague, Rotterdam, Sneek and Utrecht.

Workmen's and children's clothes are manufactured in 13 factories, at Almelo (2), Amsterdam (7), Bois-le-Duc, Enschedé, Rotterdam and Sneek. This branch of the industry in ready-made clothing finds its largest outlet in the interior of the country, although special articles (such as dust-coats, stokers' apparel, operating coats, clothing for nurses and patients in hospitals, butchers' smocks, etc.) are exported to Great Britain and Belgium and tropical outfits to the Netherlands East Indies, Egypt, Africa and Australia.

The most important branch of this industry is found in the factories of underwear for men, women and children. The increase in this trade is closely connected with the prosperity of the two principal allied branches of the textile industry in our country, that of cotton and linen weaving, and more particularly with the great advance in the manufacture of white and coloured cotton goods in Twente.

There are 106 factories of these articles in The Netherlands, employing about 4,200 hands, namely at Almelo, Amsterdam (39), Arnhem, Bois-le-Duc, Borne, Eindhoven, Enschedé, Groenlo, Groningen, Haarlem, The Hague, Kampen, Leyden, Neede, Rotterdam (17), Veenendaal, Vriezenveen (2) and Woensel.

Outer garments for women and girls are made in 44 factories, at Amsterdam (17), Delft, Dordrecht, Groningen, Haarlem, The Hague, Leeuwarden, Rotterdam, Tiel and

Utrecht. Six of these establishments — at Amsterdam (4), Hilversum (1) and Enschedé (1) — also make a speciality of corsets; and the factory at Enschedé makes a special line of the manufacture of collars and cuffs, articles which are largely exported.

In addition to the above-named factories, there are 9 which make special articles in the department of clothing, namely 2 at Vlaardingen and 1 at Bussum, which specializes in the manufacture of oilskin coats for seamen, 1 at Amsterdam and 1 at Lochem, which manufactures elastic fancy goods, such as braces, garters, suspenders and cricket-belts, 2 at Coevorden and Rhenen, which make neckties, and 2 at Amsterdam, which manufacture historical and national costumes for the stage, fancy dress balls and pageants.

The manufacture of buttons is closely connected with that of clothes. There are 9 button factories in The Netherlands (producing cloth-covered and the other buttons made of various materials): at Aalten (2), Arnhem (2), Gestel, The Hague, Utrecht, Veendam and Zalt-Bommel. The Veendam factory, which employs some 50 hands, is the only factory in The Netherlands that uses wrinkled nuts (the kernel of the fruit of a South American palm tree) for the manufacture of buttons. These buttons are sold to the large "ready-made" houses and to the dealers in trimmings both at home and abroad, finding their way as far as Japan and South America.

THE MANUFACTURE OF BRAID, LACES AND GOLD LACE.

There are 8 factories in The Netherlands that make braid and lace of cotton, wool and silk, employing about 670 hands. These are at Amsterdam, Arnhem, Bois-le-Duc, Boxtel, Enschedé, Heeze (2), Veenendaal and Zeist.

In addition the manufacture of gold lace and fancy braid, which produces the braid of uniforms as well as embroideries, tassels, fringes, curtain loops, etc., is pretty widely represented by a good many first-class establishments, which are situated at Amsterdam (5), Arnhem (2), Bois-le-Duc (3), Breda (9), Groningen (2), The Hague (8), Reuver, in the province of Limburg, Rotterdam and Tilburg.

Until the second half of the nineteenth century, hat-making was one of the numerous petty industries that enjoyed a certain importance in The Netherlands. Nevertheless, only small factories of straw and felt hats were known. Of these, there were about 56 in North Brabant. The "beaver" hat, made of the fur of goats, hares, rabbits or beavers, was at that period the usual headgear. After the invention of the "blower", which did away with the necessity for the long manipulation of the fur, the manufacture of low felt hats set in. Gradually, following in fashion's footsteps, the "fancy hat" was introduced. The manufacture of machine-made felt hats, however, hardly met with any success in The Netherlands. A few attempts made, about 1880, at Utrecht and, later, at Rotterdam failed, the native demand being too small and the skilled workmen too few. The beaver hat which, in many families, had been handed down from generation to generation, disappeared, and its place was taken by the hat made of silk plush glued on a muslin foundation previously steeped in gum-lac, a much lighter and more elegant headdress than its clumsy predecessors.

The felt-hat workers soon applied themselves solely to the manufacture of silk hats. This industry, which, with the exception of a few machine-made accessories, is exercised wholly by hand, is still practised on a fairly large scale and holds its own against foreign competition, although the number of factories has greatly decreased since 1880. This is due to the fact that the tall silk hat has been obliged to make way, to a great extent, for the low felt hat, which has now been accepted by every class of society.

North Brabant is the only province which produces, on the old manual system, a small quantity of felt hats, mainly for the use of clergymen.

The manufacture of caps is found as a petty industry in a number of small towns, often in connection with a hat and cap shop. In addition to these minor concerns and the aforesaid small hat factories, there are a certain number of factories which devote themselves to the exclusive manufacture of this form of headgear. These factories are at Amsterdam (4), Breda, Grave, The Hague, Leeuwarden, Rotterdam and Tilburg.

The exclusive manufacture of straw hats is practised in a large factory at Maastricht, and in 4 smaller factories at Amsterdam, Groningen, Maastricht and Rotterdam. The two factories at Amsterdam and Rotterdam make ladies' straw hats as well as men's.

RAMIE-SPINNING AND OTHER TRADES CONNECTED WITH THE TEXTILE INDUSTRY.

Among the fibrous vegetable matters the textile properties of which have been discovered in our time, the only one that has so far been worked in The Netherlands is ramie (the fibre derived from the bark of two sorts of nettles grown in China, Japan, the West Indies, British India and, especially, the Netherlands East Indies, whose climate and soil are particularly favourable to its cultivation). Ramie is used mainly in the manufacture of incandescent mantles which, in The Netherlands, are made principally at Amsterdam, Amersfoort, Rotterdam and Zwolle.

In conclusion, we may mention a factory of artificial silk at Amsterdam; a factory at The Hague producing "welvera" (a silk-worked cloth); a large factory of wound-dressing requisites at Amsterdam, with a factory of cotton-wool at Emst, near Vaassen; and the factories of packing materials at Amsterdam, Rotterdam, Ridderkerk and Weesp, which use chiefly asbestos, hemp, cotton and indiarubber.

THE HIDE TRADE.

There is an important hide trade in The Netherlands, as well as large manufactures of leather in general and boots in particular.

There are hide markets, at both Amsterdam and Rotterdam, at which the hides of Indian cattle and buffaloes form the principal article sold (by tender).

A Leather and Boots Manufactory at Waalwyk.

In addition, a public auction is held monthly for the sale of fresh and salted native hides, which mostly go abroad.

The following statement, from a non-official source, shows the number of hides of Indian cattle and buffaloes imported at Amsterdam and Rotterdam during the last few years:

Years.	Amsterdam.	Rotterdam.	Total.
1901	498,000	166,000	664,000 hides.
1902	506,000	162,000	668,000 ,,
1903	417,000	129,000	546,000 ,,
1904	509,000	185,000	694,000 ,,
1905	543,000	172,000	715,000 ,,
1906	409,000	149.000	558.000 ,,
1907	439,000	185.000	624.000 ,.
1908	394,000	160,000	554.000 ,,
1909	426,000	152,000	578,000 ,,
1910	507,000	162,000	669,000 ,,
1911	400,000	184,000	584.000 ,,
1912	340,000	163,000	503,000 ,,
1913	315,000	145,000	460,000 ,,

South American and African hides are also imported at Rotterdam, but only in a small quantity.

At Amsterdam, an attempt has also been made to import the hides of cattle from South Africa and elsewhere, in addition to the East Indian skins. For a first attempt, it has been fairly successful; and the favour with which these goods have been received by the trades interested has a tendency to increase.

The hides that reach the Netherlands markets are partly sold for export; what remains in the country supplies, together with other hides coming from abroad, principally from South America, the material required by the tanneries.

Tanning is one of the oldest industries in The Netherlands. As far back as 1475 a Guild of Leathersellers, Shoemakers and Hidedealers was established in Amsterdam. Not only in that town but also in Rotterdam and Zwolle was a flourishing leather industry, working chiefly for export. The wars of the latter part of the 18th century killed the export trade, and many tanneries in those towns were closed down.

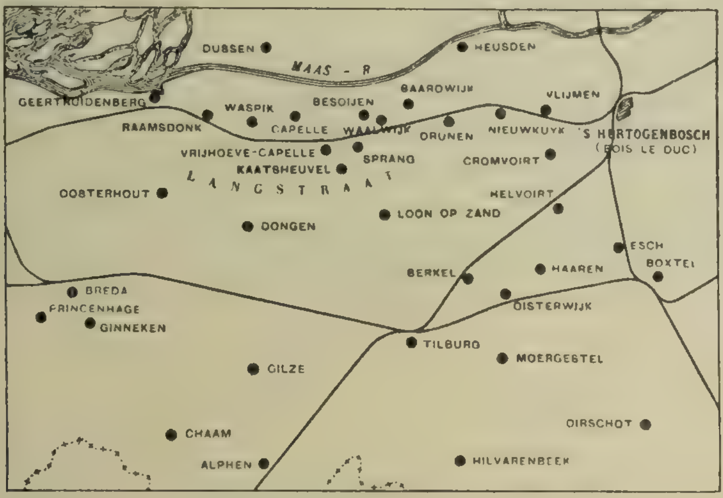
D'ALPHONSE in his "Aperçu sur la Hollande" (1810) still mentions that in those towns the largest tanneries existed, but in Amsterdam 35 yards were closed, and in Rotterdam, where 600 men found employment in former days, only 190 were at work.

Tan-pit in a Netherlands Tannery.

In the country, however, the industry started in small primitive ways, producing enough leather for the immediate requirements of the neighborhood.

Sixty years ago the tanning industry must have been a widespread industry. About 1,200 tanneries existed, scattered all over the country, more than half, however, in the country of North Brabant. No doubt the presence of a supply of good water and an abundance of oak bark, the chief tanning material of the tanner of those days, has to be taken into account, but also the easy access by means of the natural waterways must have played an important part in the development of the tanning industry in certain parts.

Up to 1875 the leather export trade flourished to Germany, Belgium and Scandinavia, but owing to the high import duties the export has gradually diminished. The trade in that period was not in a very flourishing condition, and a number of yards closed in consequence. The introduction of new tanning materials, stronger in tan than oak bark, as well as of tanning extracts was received with great caution by the Netherlands tanners, and the new products were only slowly taken up by them.



Important Centres of the Leather Industry in North Brabant.

Today there are about 430 larger and smaller tanneries in The Netherlands, employing about 2,000 hands. Of these 350 are to be found in North Brabant, giving employment to about 1,500 hands.

Important centres in Brabant are: Gilze-Ryen, Dongen, Loon-op-Zand, and the "Langstraat", a long row of villages between Geertruidenberg and Bois-le-Duc with Waalwyk as centre.

Although the number of yards has decreased greatly, the importance of the remaining ones has increased.

Home Industry in "The Langstraat."

SOLE LEATHER.

Sole leather is one of the main products and has to be divided into two classes: the properly so called sole leather and the "vache leather" (vache lissée), a distinction which is not in vogue in England.

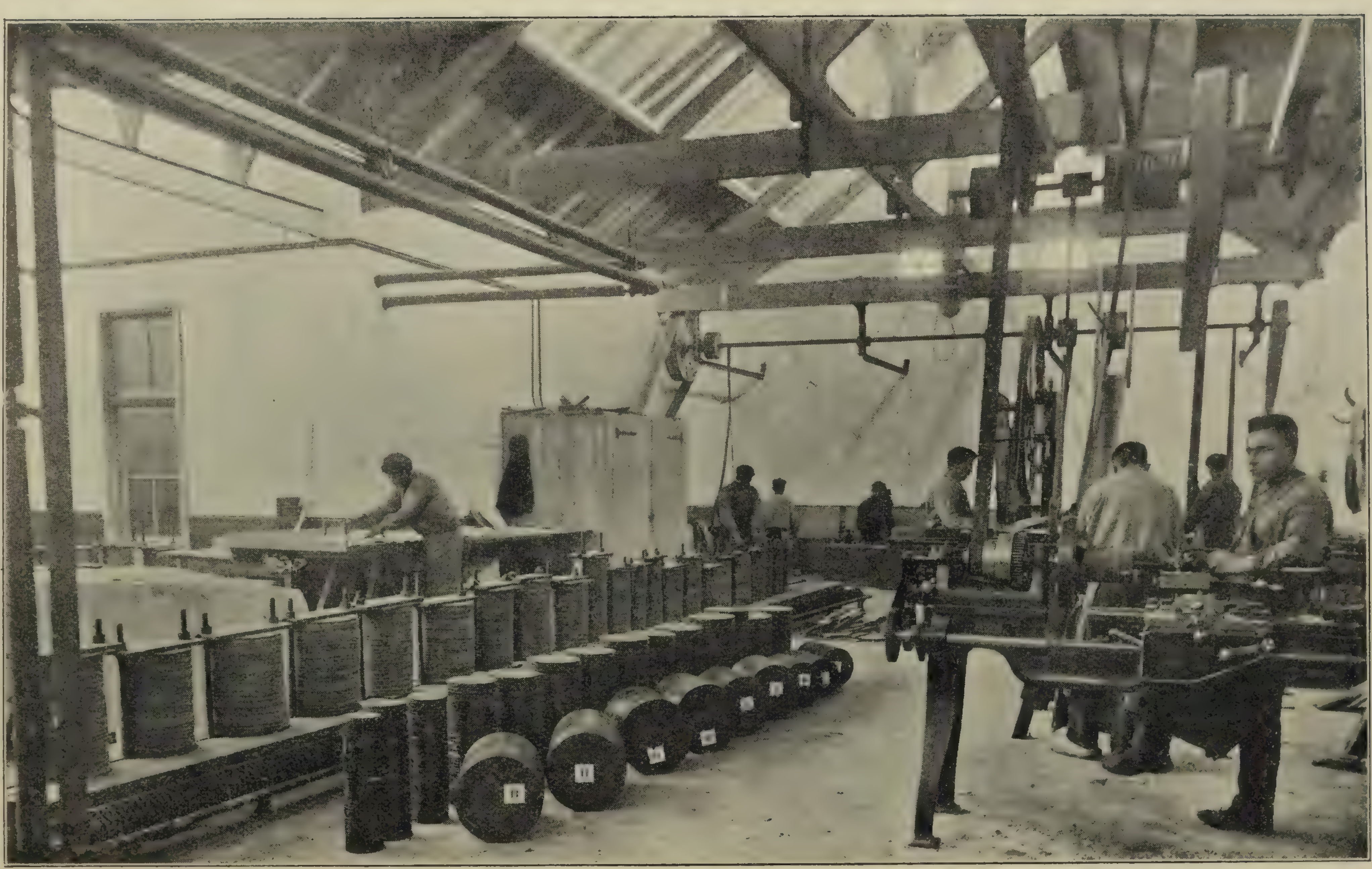
As has been said before, South American hides are chiefly used for making sole leather. The hides are unhaired by "swetting", and after being swollen in handlers with weak sour liquors of oak and pine bark, they are laid away in big pits with layers of oak bark and other materials between them, heads and shanks turned in, and weak liquors pumped into the pits. This is repeated with fresh layers of tanning materials every two or three months until, after 12—18 months, the hides are tanned through. After being drawn from the last layer, they are cleansed from adhering dust and bark, and then dried and rolled. First-class South American hides are chiefly used for this method of tanning, and the resulting leather is of an excellent quality. As however the time of tanning is long and the yield of leather small, the profits to be made are not large with ever increasing prices of hides and prices of leather not corresponding with these. This is the reason that more modern methods are introduced, and the resulting product is so called "vache leather", manufactured chiefly with drum tannage.

HORSE LEATHER.

Although the tanning of horse-hides, owing to the introduction of chrome leather, has greatly diminished, there is still an important production of horse hides (crop leather) for the high, waterproofed Wellington boots and for hydraulic purposes.

UPPER LEATHER.

Bark-tanned upper leather is still manufactured on a small scale, but the introduction of the chrome-tanning process is chiefly responsible for the falling off in the production of this class of leather.



View of one of the departments of a belting-factory in The Netherlands.

Box calf and glacé kid are only produced on a very small scale, most of the native calf skins being exported as mentioned above.

Instead, a flourishing industry of so called "Box-rund" has developped in later years. Cow hides, principally native hides, which owing to their spreadiness and fine texture are suitable for this kind of work, are after being limed and split, chrome-tanned and finished with a box finish for upper leathers, most of which is exported.

Sheepskins for linings are also manufactured, and chamois leather is produced too.

An entirely separate branch of the leather trade is the manufacture of parchment.

A factory for the preparation of this article exists at Borculo, where it was founded in 1830. It makes parchment for bookbinding, drums, etc. It is the only factory of its kind in The Netherlands, and supplies not only the home demand but exports to every European country, to Australia, Brazil, etc.

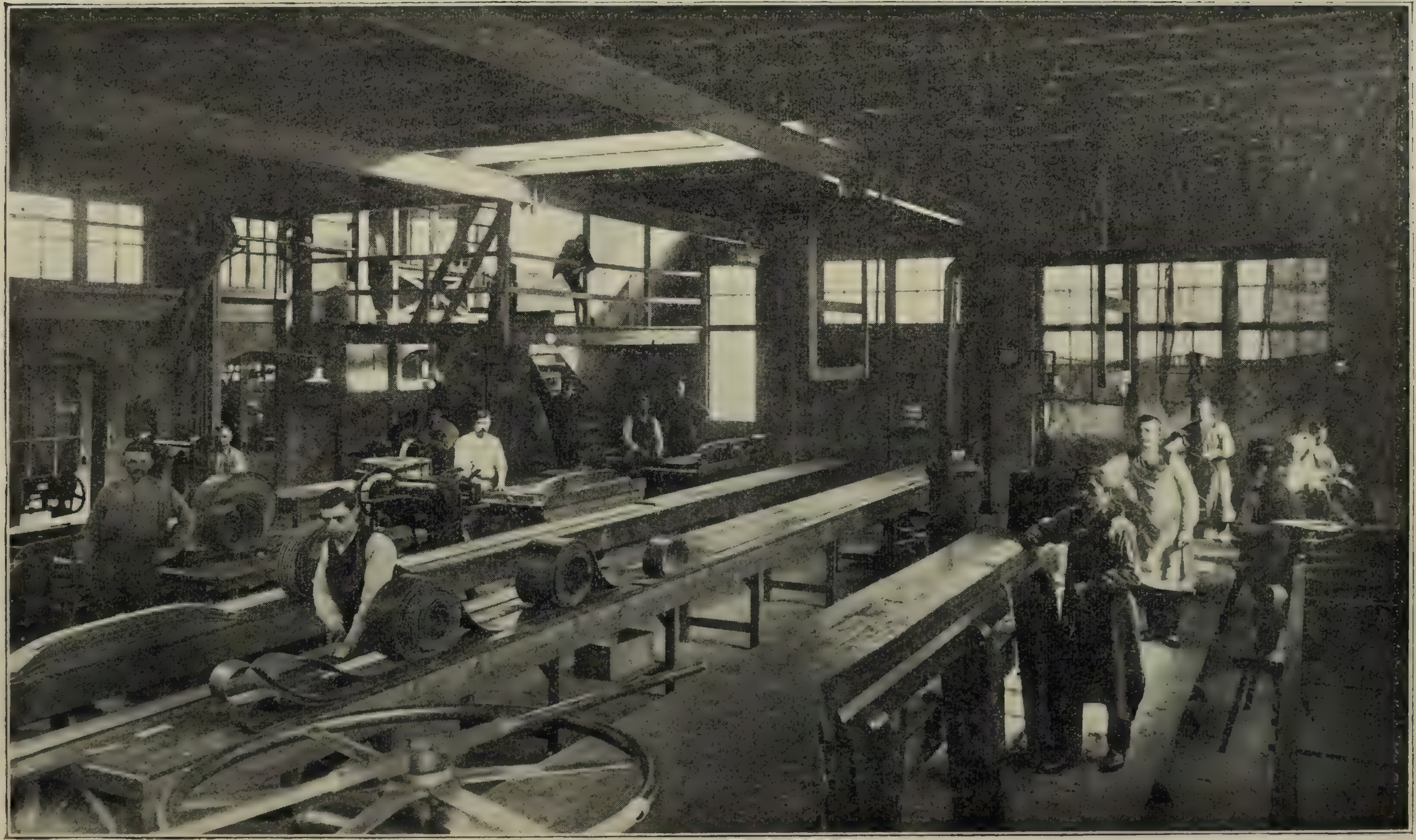
The leather industry has now developped in nearly every branch in The Netherlands, and has also created an important trade in tanning extracts and materials from abroad.

The home staple tanning material, the oak bark, chiefly from Gelderland (province), is however bought directly by the tanners or tanner federations themselves.

BELTING LEATHER.

This and other classes of technical leathers are chiefly produced at Eibergen, Lochem, Waspik and Waalwyk, in chrome as well as in vegetable tannages. Some manufacture the belts themselves, whereas others only sell them in butts. A flourishing export trade has developped in both ready-made belts and the butts, principally to Great Britain, Sweden, Russia, Spain and Italy.

The hides of East Indian (Java) cattle, buffaloes and Netherlands hides are used.



View in a Belting Leather Factory.

In connection with the tanning industry the manufacture of boots, shoes and slippers has equally developped in North Brabant and other parts.

First of all it was a home industry, carried out by the artisan and his family with one or more workmen. But slowly, owing to the gradual introduction of shoe-making machinery, the shoemakers' trade has developped from a craft into an industry. The distribution of labour introduced herewith, altered of course the character of the industry entirely.

Manual labor was replaced for the most part by complete mechanical installation in the latter part of the 19th and the beginning of this century.

Today there are about 200 boot factories, large and small, in The Netherlands, employing about 6,300 hands.

The largest number of factories is at Dongen, whilst factories are also found, amongst other places, at Kaatsheuvel, Besoyen, Waalwyk, Bois-le-Duc, Loon-op-Zand, Lichtenvoorde and Amsterdam.

The products of the Netherlands shoe trade are noted for their strength and their irreproachable finish. It is therefore not surprising that the exports of Netherlands boots and shoes should take place on an ever-increasing scale, among other countries to the Netherlands East Indies, South Africa, Great Britain, Denmark, Switzerland, Germany, Austria and Norway.

THE INDUSTRIES OF THE NETHERLANDS.

COMPILED BY THE COMMERCIAL DEPARTMENT OF THE
MINISTRY OF AGRICULTURE, INDUSTRY AND COMMERCE
WITH SPECIAL ASSISTANCE OF MR P. DOYER, SECRETARY
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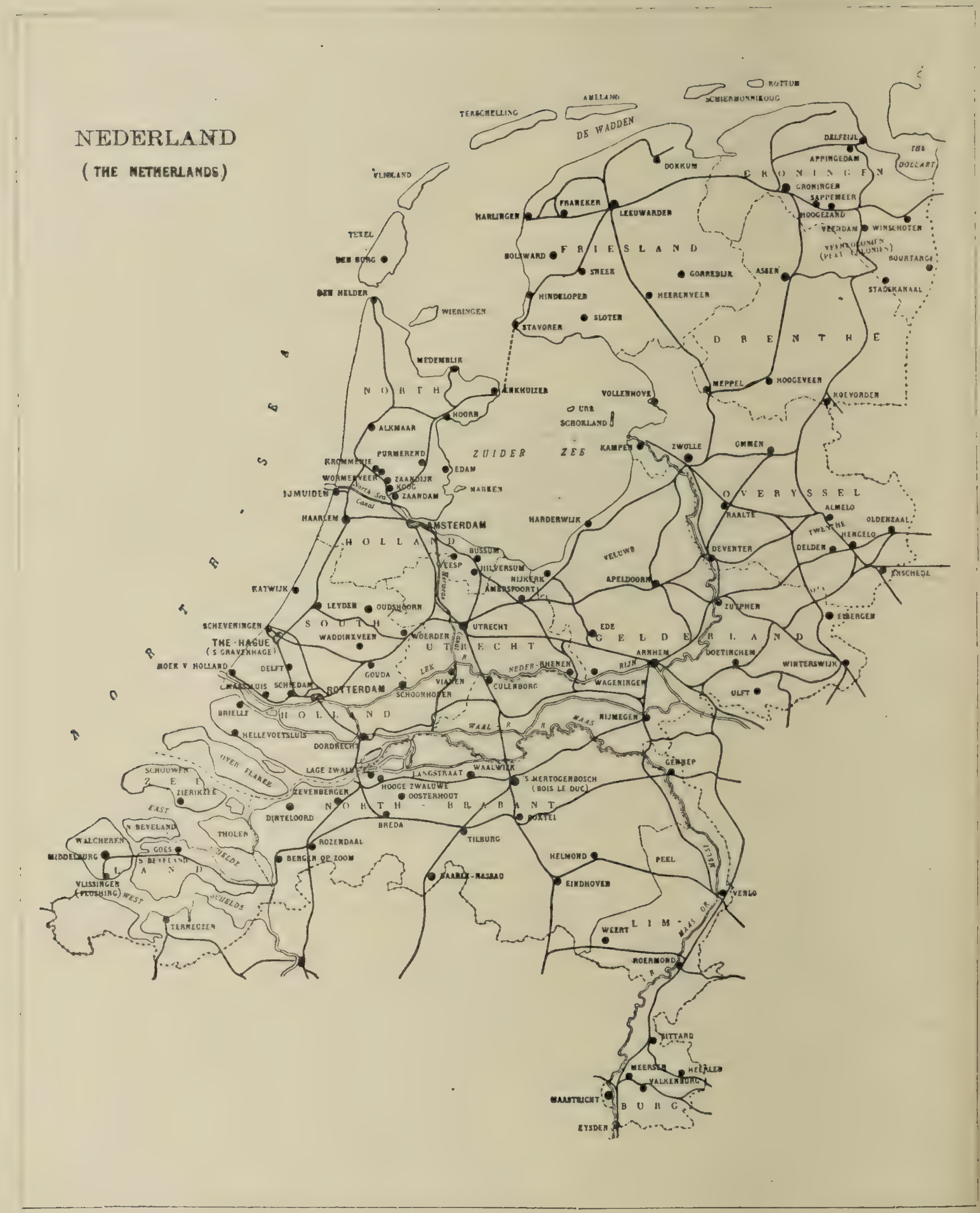

NEDERLAND

(THE NETHERLANDS)

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no. 40

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PART II.

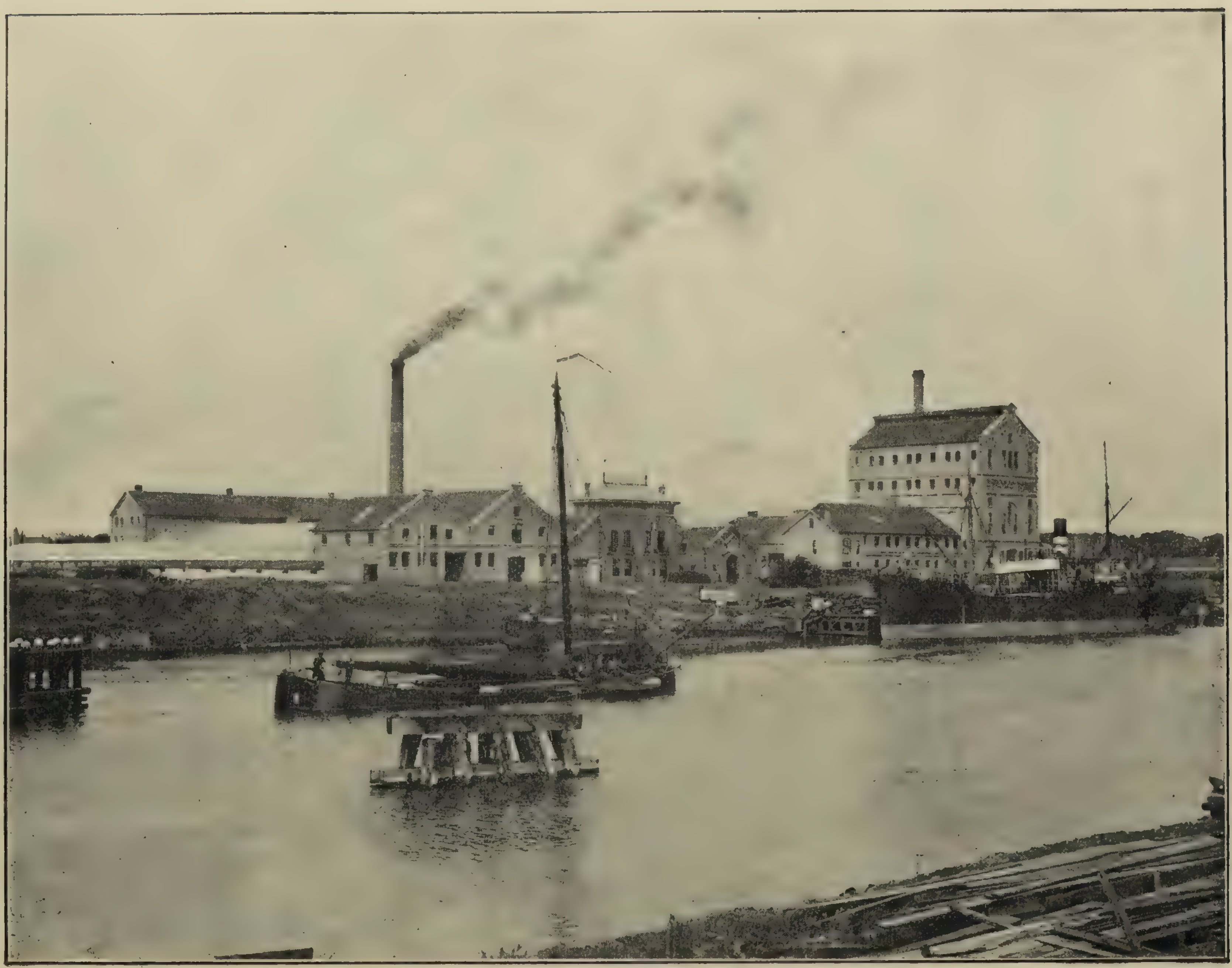
THE PAPER AND STRAWBOARD MANUFACTURES; THE CARDBOARD INDUSTRY; THE PRINTING TRADE; POTTERY, GLASS AND BUILDING MATERIALS; THE TIMBER TRADE AND ALLIED INDUSTRIES.

I. THE MANUFACTURE OF PAPER AND STRAWBOARD: THE CARDBOARD INDUSTRY.

THE manufacture of paper acquired considerable importance in The Netherlands at a very early date.

Traces of it are found at the beginning of the sixteenth century. In the second half of the seventeenth century, Apeldoorn had become a very important centre of the paper industry. The manufacture of paper also made progress, during the latter half of the seventeenth century, in North Holland, where the first paper-mill, "De Kauwer" (The Muncher), had been established at Zaandam West in 1606. A large number of others were soon started and prospered; and their excellent products acquired a wide reputation. Whereas, in Gelderland, the streams and other water-courses supplied the motive power, the mills were driven by the wind in the Holland polders.

The war of 1672 caused several paper manufacturers to leave Gelderland, that province being occupied by the enemy. These manufacturers settled in the neighbourhood of the Zaan, where they engaged the local paper manufacturers, who only made packing paper, to manufacture white paper as well. It was after this period, in particular, that



Paper manufactory at Velzen, near Haarlem.

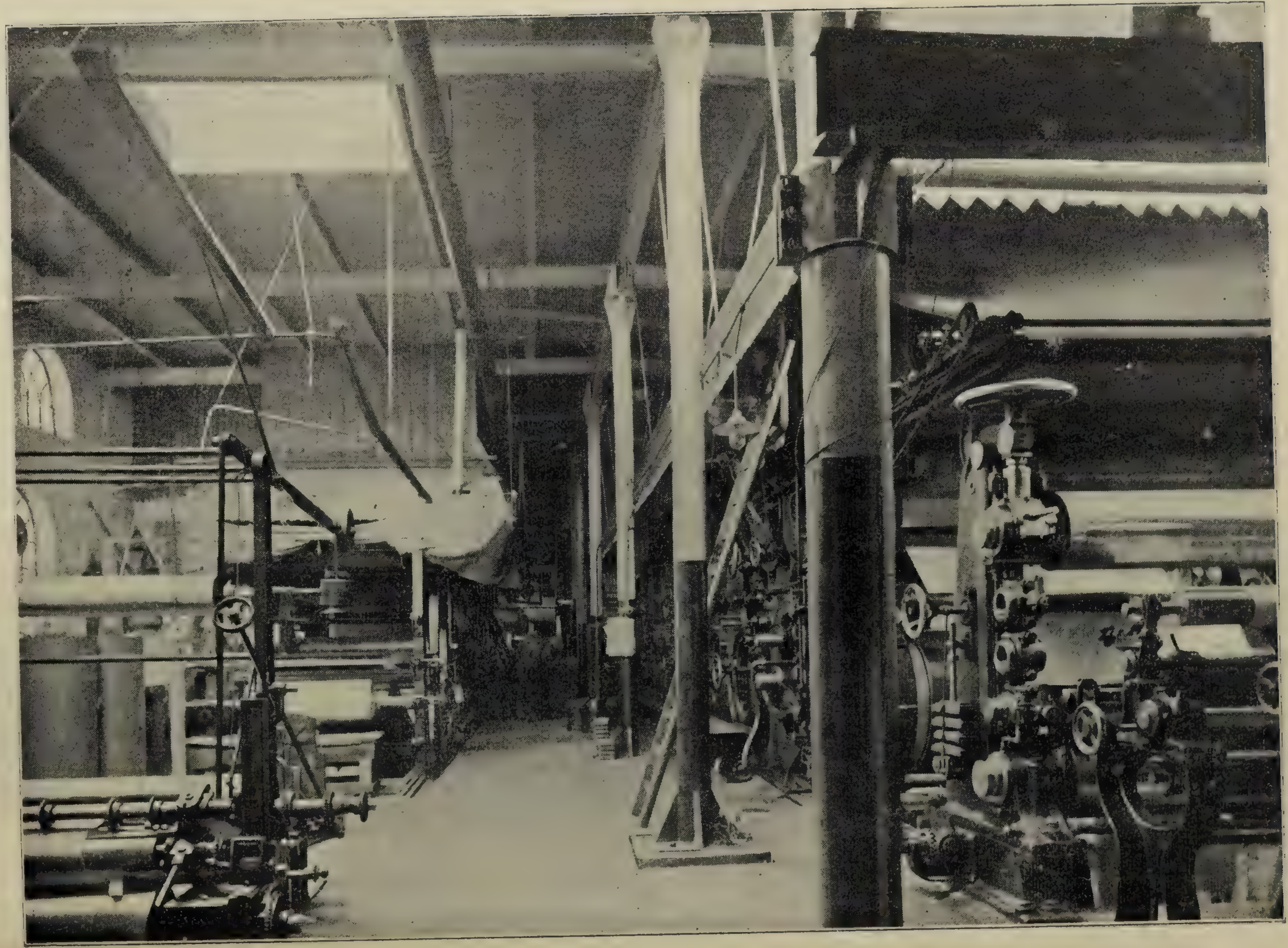
Netherlands paper acquired a European celebrity, which it well deserved on account of the purity of the rags of which it was made and especially on account of its toughness and its even thickness. The well-known water-marks, such as the arms of the Cities of London and Venice, the Flower-de-luce, the Unicorn, the Elephant and the Beehive, date from this period.

The invention in The Netherlands, in 1690, of the pulping-mill was of great value to the improvement of the method of preparation. This very simple, but ingenious machine was used, as its name implies, to stir and pulp the thready substances in water, so as to reduce them to a fine paste. It is known to this day, both in The Netherlands and in other countries, as the "Hollander."

At the beginning of the nineteenth century, hand-made paper was largely superseded by machine-made paper, the invention of a Frenchman named Nicolas Louis Robert.

By the middle of last century, all the mills on the Zaan which used to manufacture hand-made paper had disappeared. In Gelderland, however, the manufacture of paper by hand was continued, and at present there are still a few mills where this ancient trade is carried on, but almost the whole of the produce is exported.

The first paper-mill worked by machinery was established at Zaandyk in 1834; and this example was soon followed in other places. After 1859, the old hand-worked mills were gradually replaced by mechanical paper-mills. This caused a large decrease in the production of hand-made paper and a still larger increase in the amount of machine-made paper. There are at present 34 paper-mills, large and small, in The Netherlands, employing about 3,200 hands. Most of these factories are situated in the Veluwe (Gelderland), where Apeldoorn, which has 9 mills, employing about 700 hands, is the principal centre of the industry. In the Zaanland and its neighbourhood (Velsen), paper is manufactured in 4 mills, employing about 900 hands. Other important paper-mills are found at Brummen, Doorwerth, Dussen, Epe, Heerde, Maasniel, Maastricht, Meersen, Nymwegen, Renkum, Tiel and Waddingsveen.



View in a paper-mill on the Veluwe (Gelderland).

The packing-room of a paper manufactory.

Alongside of this paper industry, there has sprung up, since 1874, in the peaty districts of the province of Groningen ("Groninger Veenkoloniën") under the influence of various geographical and economic circumstances, a branch industry very closely connected with paper-making. This is the manufacture of strawboard, which, started originally with a view to taking advantage of the great quantity of straw supplied by the agricultural parts of the province, as well as to employing the excellent waterways, has prospered and succeeded to such an extent that, together with the making of potato starch, it has become an important source of wealth to all classes of the population.

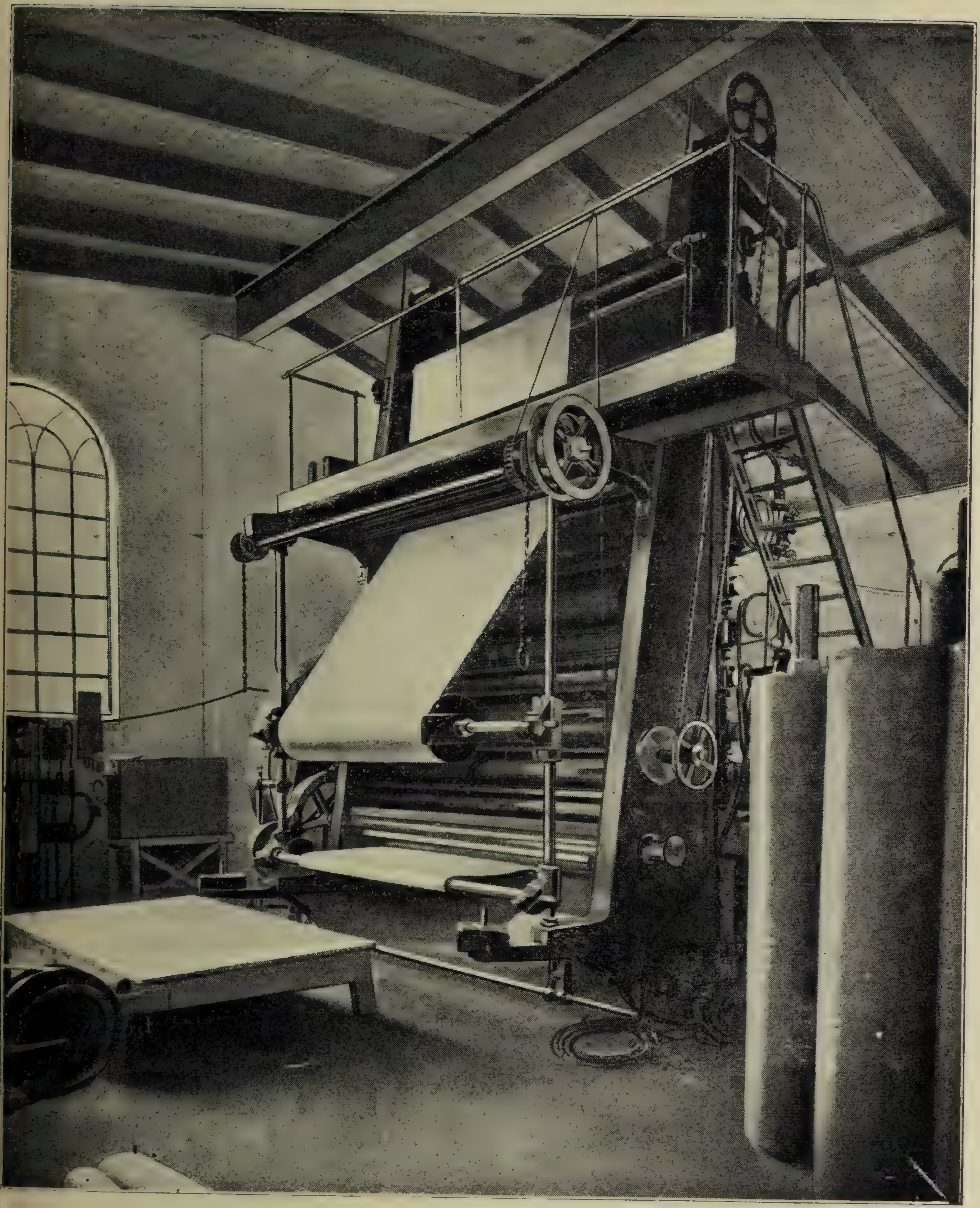
There are 22 strawboard-mills (with about 2,000 hands) producing about 700 tons of strawboard daily, viz., at Appingedam (2), Hoogezand (2), Midwolde (1), Nieuweschans (1), Oude Pekela (9), Sappemeer (1), Ulrum (1), Veendam (3) and Wildervank (1), all situated in the aforesaid peaty districts of Groningen. Outside this province, there is one mill at Coevorden. Some of these mills are owned by cooperative societies.

The figures which we have quoted are an eloquent proof of the extent of this industry in Groningen, which is a very wealthy province inhabited by a most energetic population.

Whereas the strawboard-mills use straw exclusively as their raw material, the paper-mills employ various other materials, such as machine-made wood-pulp, wood and straw-cellulose, rags, straw and old paper.

In The Netherlands there are two factories manufacturing wood cellulose and one manufacturing only straw-cellulose, while one of the first-named two factories produces also machine-made wood-pulp.

The most important branch of the Netherlands paper trade, next to strawboard, is the paper for newspapers, which is manufactured from machine-made wood-pulp. The ordinary printing paper and ordinary writing paper are made of wood and straw cellulose. For the better quality papers (official documents, &c.), rag paper is preferred, rags being still largely used in paper-making and consequently forming a valuable article of commerce; they are purchased retail



A hot-press engine.

and collected all over the country. They are sorted before selling, so as to separate the various qualities.

Rag warehouses doing business on a large scale and fitted up for sorting are found in many places. The material thus sorted is exported in large quantities.

Different sorts of paper manufactured in The Netherlands are also in large demand for export, including the handmade paper known as "Mediæval Note," which, because of its excellent quality, is much sought after abroad, especially in Germany, Great Britain, France, Australia and America.

The most important article of export in the Netherlands paper trade is strawboard, about 95 % of the output of which is exported, principally to Great Britain, Turkey, the United States of America, Canada, Brazil, the Argentine and Australia.

Formerly, straw paper used to be also manufactured. There was a good demand for it, on account of its very low price; but other packing papers have since taken its place entirely.

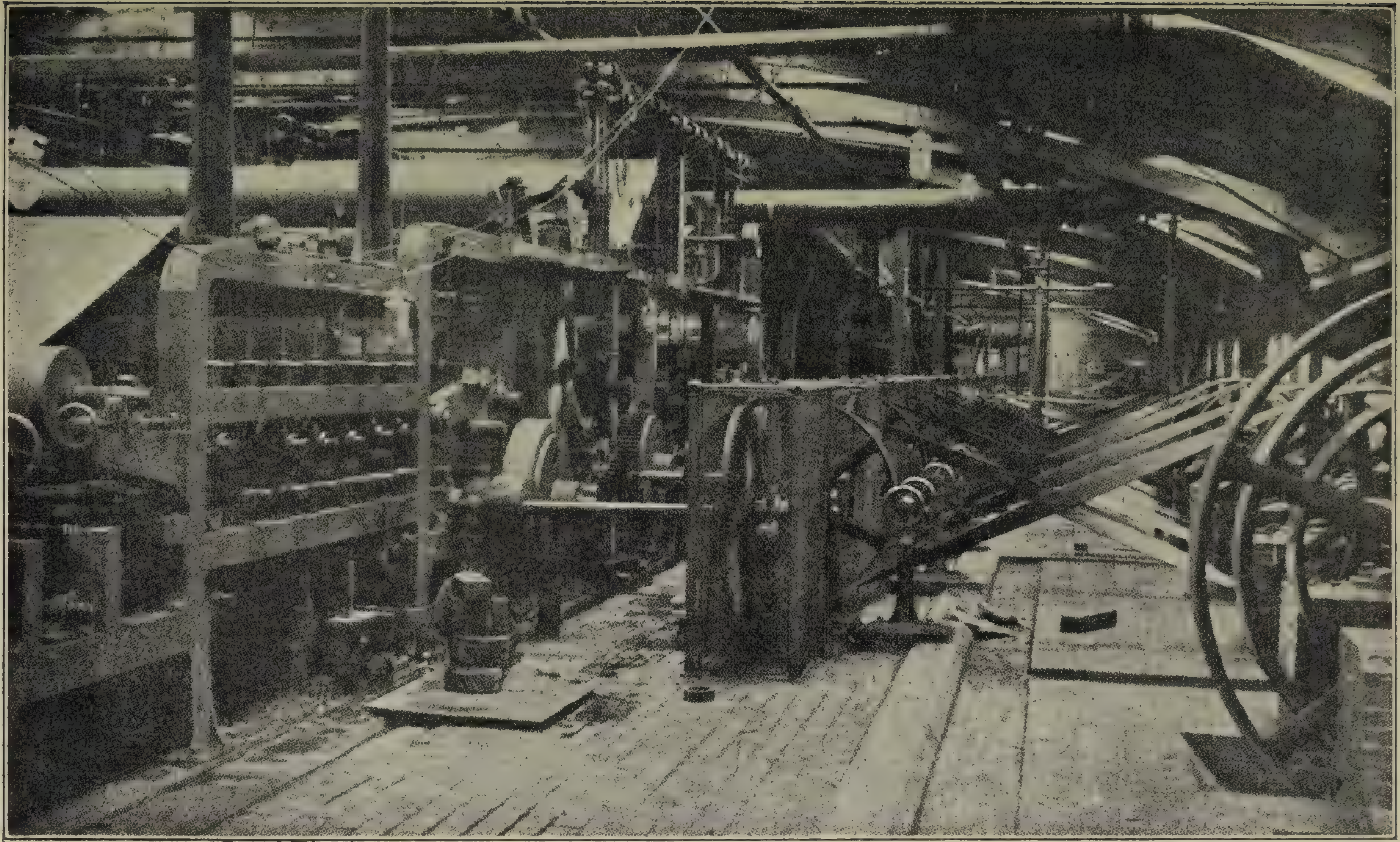
It is still manufactured at Sappemeer and Tiel, but in small quantities and solely for export.

The manufacture of imitation parchment paper is of greater importance.

In 1913, the paper exports of all kinds represented a value of about 18,900,000 guilders (or £ 1,575,000). The export of thick and thin mill-board (mostly strawboard) represented in the same year a value of 69,123,000 guilders (or over £ 5,700,000). These few figures are enough to prove that The Netherlands hold a considerable place in the paper trade.

In conclusion, we may mention four carton-pierre mills, at Amsterdam, Monnikendam, Gouda and Schildwolde, and the rather important box-making trade.

There are about 40 mills in The Netherlands manufacturing paper boxes and bags, finding a market for their wares at home as well as in foreign countries, such as the Netherlands Indies, Great Britain, British India, Belgium and the Levant.



View of a strawboard manufactory at Sappemeer (Groningen).

II. THE PRINTING TRADE.

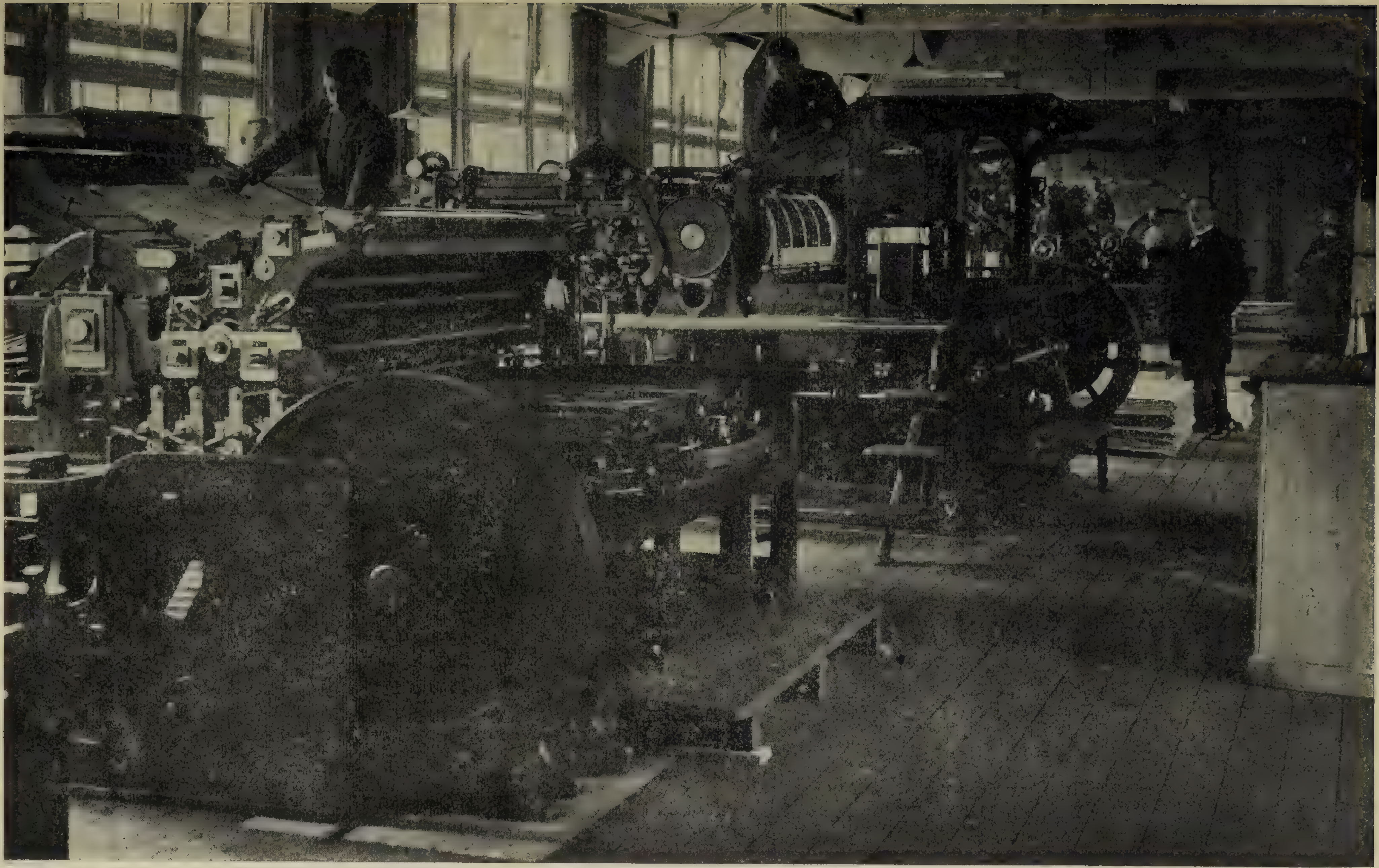
It is many centuries since the art of printing reached a high state of perfection in The Netherlands. That country may well look upon itself as the native land of printing and the book trade and pride itself on the possession of families like the ELZEVIRS, the BLAEUS and the ENSCHEDÉS, who, in the course of the centuries, were the pioneers of typography.

Needless to say, the book printing works, including the newspaper presses and commercial printing offices, are the most numerous and the most widely distributed. It is rare to find a village that does not possess a printing office, even if it be but a small one, boasting only a treadle-press. In all, there are about 870 printing establishments of any importance in The Netherlands, employing about 17,000 hands. Most of these are in the chief cities, such as Amsterdam, Rotterdam and The Hague, and in large provincial towns.

The capital holds first place, with 138 printing works; Rotterdam comes next with 80; then successively, The Hague, with 56; Groningen, with 31; Haarlem, with 23; Utrecht, with 21; Leyden, with 20; Arnhem, with 15; and Nymwegen, with 14 printing works.

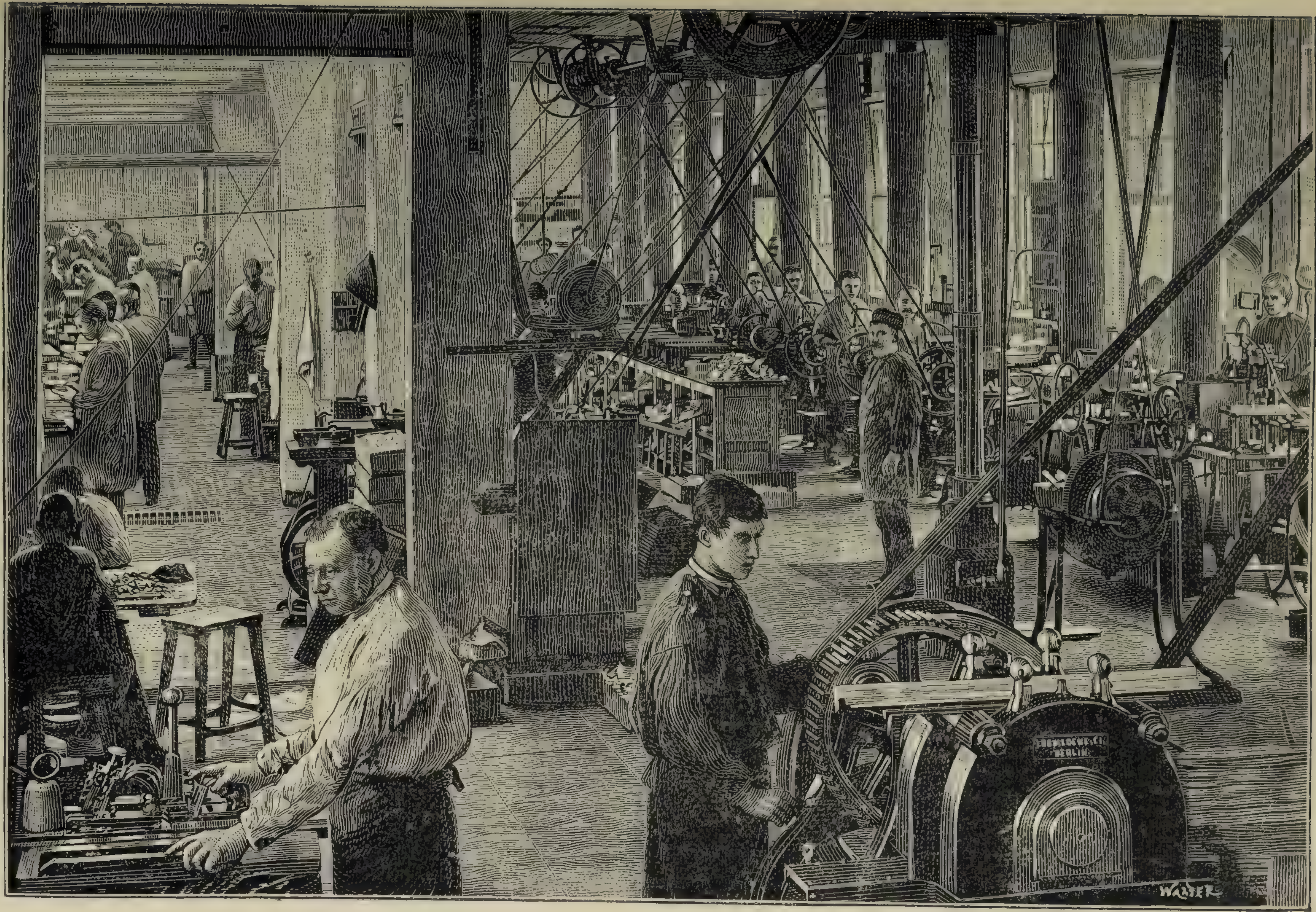
Most of these printing works are worked by steam, gas-engines or electricity; and a great number are equipped with all the latest printing-presses and type-setting machinery or (in the case of newspaper printing offices) with rotary presses and stereotyping plant.

Side by side with printing and often closely connected with it (especially since the application of chemistry and photography to this branch of the trade) there have sprung up works for the reproduction of drawings, photographs, pictures, &c., that is to say illustration work and picture printing of every description. Every known process of this kind is employed in The Netherlands. The different processes of illustration — wood-engraving, lithography, chromo lithography, photo-lithography, photo-typography, engraving on copper and steel, etching, heliogravure or photogravure, chimigraphy or zincography, photo-chimigraphy, photo-zincography or helio-typography, auto typography, &c. —



A printing works at Haarlem.

View in a printing works at Haarlem.



Interior of a type foundry at Haarlem.

are all represented either separately or in different combinations, especially in the large cities, such as Amsterdam, Rotterdam, The Hague, Haarlem, Utrecht and Leyden ; and some of these establishments have attained so high a degree of perfection that the work from their presses satisfies the most exacting requirements from every artistic and technical point of view.

The output of this Netherlands industry vies with the finest work of other countries ; and it is not to be wondered at that foreign houses often entrust the Netherlands firms with important orders. The same thing occurs in the case of the lithographic and typographic firms.

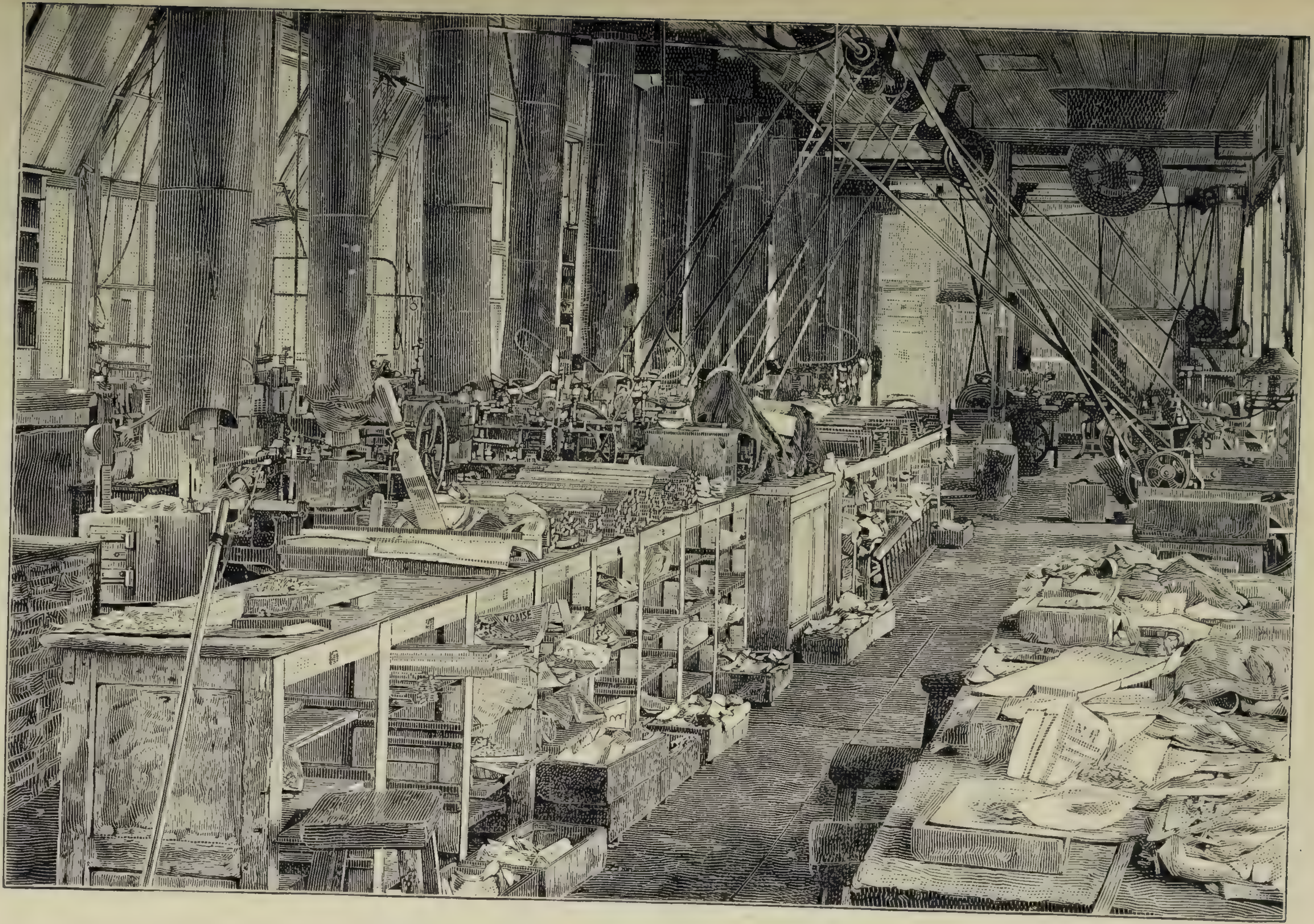
These are often entrusted, for instance, with the printing of bonds, stamped paper, postage stamps, etc., for the Netherlands Colonies, Persia, Brazil, &c., and there still exists, at Leyden, an old and celebrated firm which prints expensive works in the classic and oriental languages for foreign countries, whilst others, at Amsterdam and Haarlem for instance, often execute orders for Great Britain, France, Germany, Africa, Australia, &c.

Printing in general owes a great deal to the artistic sense and the technical knowledge, together with a go-ahead and enterprising spirit, which characterise many of the Netherlands publishers. This applies to the old-established firms, whose reputation is already made, as well as to their younger competitors, who are still making their way. For it is thanks to them that editions of great value so often see the light of day and that the greatest attention is paid to the production of literary and scientific works.

In the branch of commercial printing and advertisements, fine artistic work is increasingly required, both for colour-work and for ordinary printing.

III. THE POTTERY TRADE.

From the earliest times, the potter's art has had able exponents in The Netherlands, where the potter's industry was known even under the rule of Julius Caesar, 50 B. C., and found an abundant supply of plastic material in the fine



Interior of a type foundry at Haarlem.

quality clay, as "fat" as could be wished for, which the rivers deposited in thick layers along their banks. But the artificer was content to fashion this clay, without purifying it, into coarse pottery, such as pots, pans, pitchers and other utensils for keeping or cooking food and drink.

This primitive craft gave birth in the subsequent centuries that followed to the manufacture of glazed pottery for domestic purposes. In the course of development, the last-named gradually ripened into a manufacture of more elaborate articles intended to serve as decorative objects and composed of more or less pure materials.

As in other countries, the pottery trade in The Netherlands passed through various stages of development in the course of the centuries. To this day, the industry is divided into a number of branches, each of which turns out a different kind of article, from the perfectly plain utensil for kitchen use to the rarest and costliest art pottery. Between these two extremes there is room for a great number of varieties.

In a score of Netherlands factories (the most important of which are at Gouda), plain pottery for daily use (such as pots, saucepans, pipkins, terrines and the like) are always made in the rough material. But the sale of these shows a tendency to diminish, owing to the growing preference for cooking utensils of enamelled hardware.

With regard to white china (ornamented or not), for dinner services and other domestic uses, that branch is more limited as regards the number of factories.

In 1835, PIERRE REGOUT, of Maastricht, decided to found an establishment for the manufacture of household articles that had been hitherto imported. This factory, opened in 1836, was the starting-point of one of the largest enterprises of this kind in Europe, one which has gained for Maastricht ware a world-wide reputation.

A large Belgian firm transferred its Clermont factory to the Limburg capital, while, in 1885, a factory making china and tiles was started in the same town.

Apart from a factory at Meerssen (near Maastricht), which makes "pâte dure," and an art-pottery factory at The Hague which makes "pâte tendre," there is no pottery in

The interior of a pottery works at Gouda.

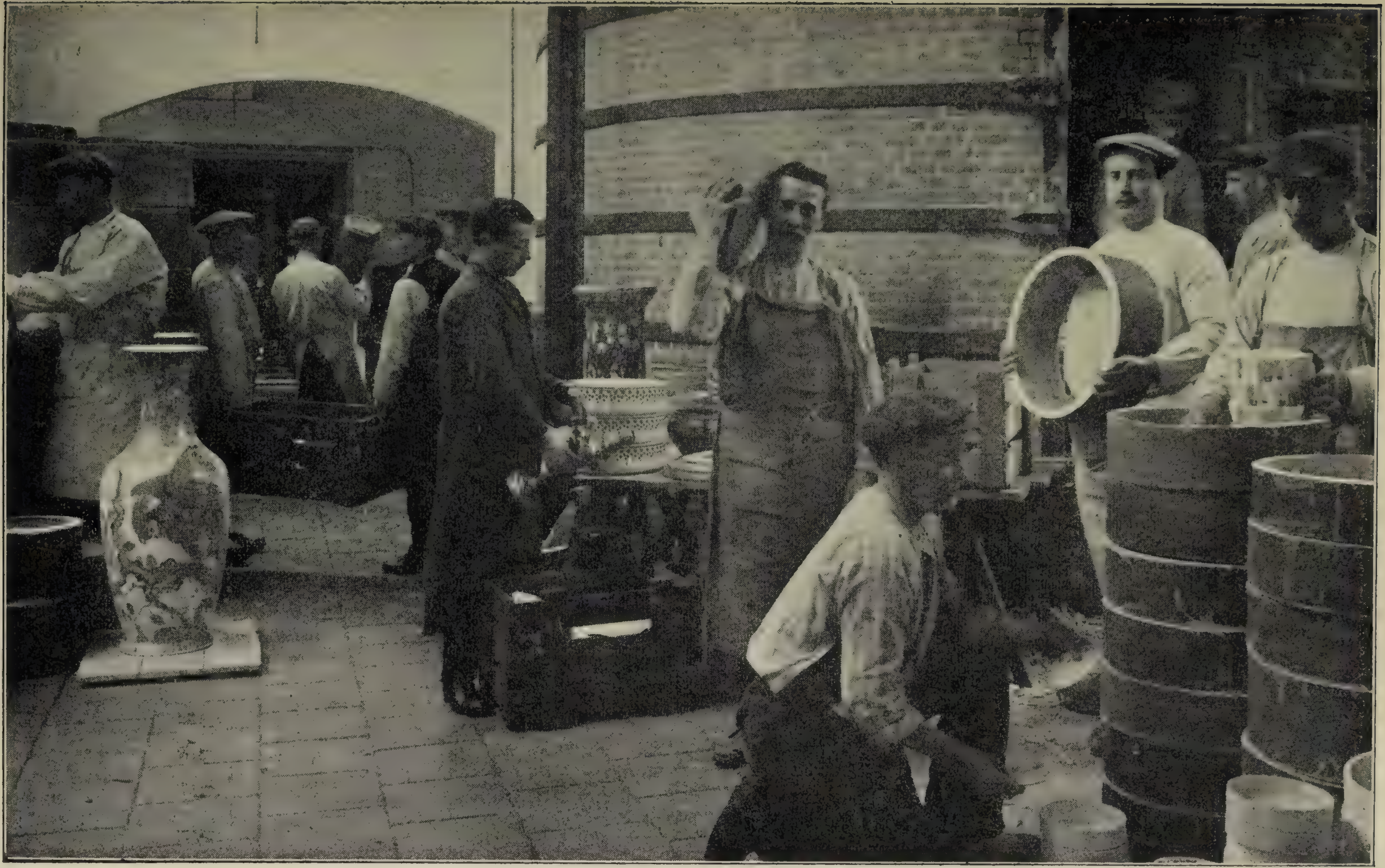
The Netherlands, at present, producing the finest china, known as porcelain. In the seventeenth and eighteenth centuries, an attempt was made in The Netherlands, as elsewhere, to imitate the celebrated Chinese and Dresden porcelains which were everywhere the fashion, but they disappeared by degrees when the market became flooded with foreign porcelains.

The china or art-pottery trade, which was once so celebrated in The Netherlands, revived, on the other hand, in the second half of the nineteenth century. This industry had originated in the manufacture of tiles, which, in the latter half of the seventeenth century, had reached its zenith, from both the technical and artistic standpoint, at Delft, where it was directed by such artists as ABRAHAM DE KOOGE, AELBRECHT DE KEIZER, ADRIAEN PYNACKER, FREDERICK VAN FRYTOM, and JACOB WEMMERZ HOPPESTEIN. These products (known as Delft ware) found many admirers in nearly every European country, as well as in the East Indies and America.

In the course of the eighteenth century, the success of the Delft goods, due to the graceful and decorative shapes which the artists gave them and which made them so attractive, led to the starting in other towns of pottery works on the same lines. But, however great the esteem in which "old Delft" was held, with its delicate tints and with the impurities of the material hidden by an opaque and decorated glaze, it had to give way, in the second half of the eighteenth century, first, to the Oriental porcelains, which, reaching Europe in large quantities, were becoming less expensive; secondly, to the products of the French factories which imitated old Delft; and, lastly, to the English earthenware known as Wedgwood, from the name of its inventor.

Delft, which at one time boasted 30 earthenware factories, possessed only 8 in 1808 and only 5 in 1819. Of these, two, "De Drie Klokken" ("The Three Bells"), and "De Porceleyne Fles" ("The Porcelain Bottle"), continued working until 1850. The first also then closed its doors.

After 1870, the proprietor of the second factory, JOOST THOOFT, succeeded, with the assistance of an octogenarian,



View in a pottery works at Gouda.

the last painter-tilemaker, in giving fresh life to this industry.

In 1876, the first attempts in "blue and white" came out and were so well received on every hand that soon there was no doubt of the success and even of the world-wide celebrity which Delft ware was once more to achieve. From that period can be dated the expansion of the modern pottery trade, the wares of which, with their beautiful shapes and artistic decorations, combined with technical qualities which come nearer and nearer to perfection, are highly esteemed both at home and abroad.

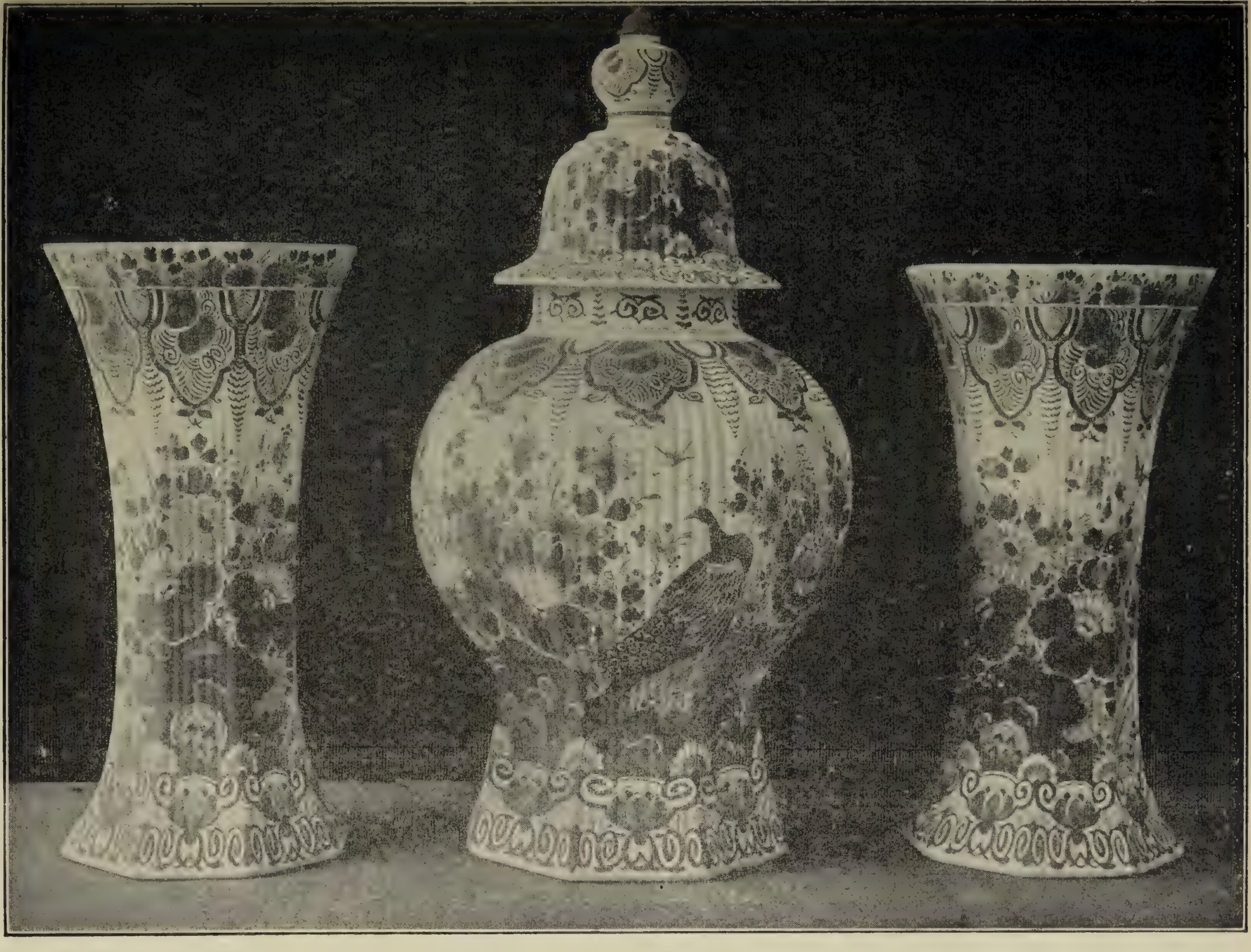
It was not surprising, therefore, to see imitation and competition once more starting in the other towns while Delft was working to regain its ancient reputation in the potter's craft.

In this way, an earthenware and porcelain factory was set up at The Hague (in 1883) and art potteries at Amsterdam, Arnhem, Bergen-op-Zoom, Delft, Dordrecht, Gouda, Harlingen, Hilversum, Lemmer, Makkum (in Friesland), Nymwegen, Oegstgeest, Utrecht and Zoeterwoude.

A great variety of wares are made in these factories: not only art pottery (vases, jars, etc.) and articles for daily use (dinner sets, tea sets, etc.), but tiles forming regular pictures, of which certain factories have made a speciality.

At Makkum, in the province of Friesland, they also make art pottery; but here they devote themselves especially to producing ware in imitation of the old "Makkum Blue", which has become scarce and for which the Americans, Germans, French and others often pay high prices. Tiles for walls and chimney-pieces, ornamented with all sorts of historical pictures, landscapes, etc., in the primitive style, according to the old Netherlands traditions, are made in two works at Utrecht, one of which also produces tiles with modern designs.

Another sort of tiles made in The Netherlands and principally in the Maastricht pottery and porcelain works, is the printed tiles. The design is printed in resinous colours, on paper which is pasted on the tile before firing; the paper is then removed as though it were a transfer picture, by wetting it with water.



Modern Delft ware.

The making of Gouda pipes is a special branch of pottery work. For a long while, The Netherlands had, so to speak, the monopoly of this industry. At the beginning of the seventeenth century, people smoked short pipes with small bowls and thin stems, which were manufactured at Gouda as early as 1637. The first manufactory of long pipes was started there between 1650 and 1660. For a long time, the inhabitants of Gouda far surpassed all their rivals, both foreign and native, in the art of making clay pipes; and they preserved the secrets of their manufacture.

In the years 1720 to 1751, the Gouda pipe factories were in their glory: 29 furnaces were kept continuously going, and no less than 16,000 men, women and children earned their living at this trade.

But, from that time, the trade began to decline. In 1751, there were 374 master pipe-makers paying their subscription to the guild; in 1754, there were only 319, and from that time the number decreased continuously, so that, in 1815, we find only 123.

It is, however, easy to understand that this trade did not participate in the nineteenth century revival of Netherlands industry. Cigars and cigarettes have more and more taken the place of pipe tobacco in The Netherlands, and of those who still cling to the pipe there are only a limited number who honour the "gouwenaar" (gouda pipe) of ancient days: the generation that kept religiously to the manners and customs of old days is fast disappearing.

In 1857, Gouda still sheltered 54 pipe factories; in 1874 there were only 34 left; in 1890, there were still 18; and at the present time, there are 6, employing about 200 hands. Nevertheless, this industry, which made the town of Gouda so celebrated in the past, still constitutes a trade of some importance, giving work to many people and consequently representing a source of income to a number of households. For these pipes are still bought not only in the rural districts, but also abroad, where over half the present output is sold.

The pipes are exported to the Netherlands colonies, Belgium, France, Germany, Denmark, Africa and America.

IV. GLASS.

In The Netherlands four different kinds of factories, namely bottle works, plain glass and crystal factories, a window-glass and looking-glass factory carry on this industry.

In addition there is a very large glass industry in the country, in which glass is fashioned and worked, cut, bent, painted, leaded, etc.

As mentioned above, there is only one looking-glass works (at Maassluis), which was not founded until 1910.

The following figures show the imports and exports of window-glass in The Netherlands in the years 1904 to 1913:

YEAR.	Imports (in guilders) *	Exports (in guilders) *
1904	1,283,651	—
1905	1,714,236	—
1906	1,775,994	—
1907	1,499,760	—
1908	1,419,116	—
1909	1,646,403	—
1910	1,908,210	—
1911	1,749,835	285,250
1912	2,389,609	643,300
1913	2,529,000	812,000

* A guilder is about 1s. 8d.

In the looking-glass factory at Sas van Gent, they make sheet-glass, which is partly used for making roofs and paving-slabs and partly for plate-glass, quick-silvered or otherwise.

The fashioning to which the produce of this factory is subjected to fit it for the purposes which it has to serve (bending, bevelling, polishing, plating, silvering, etc.) is carried out at the works mentioned above, the chief of which are at Dordrecht, The Hague, Amsterdam, Rotterdam and Haarlem.

Bird's-eye view of a glass works at Leerdam.

Only part of the output of these works is used in the country, the greater part being exported, principally to Great Britain.

As long ago as the seventeenth century, fine crystal and ordinary glass ware for domestic use were made in The Netherlands. At that time, Amsterdam glass had a far higher reputation than that turned out by the Hainault glass-works, and its fame vied with that of the celebrated Venetian crystals. There still exist seven glass factories, to which are attached glass-cutting and engraving works. Two of them have special workshops for engraving glass with acid.

They manufacture every kind of glasses and tumblers, bottles and stopper-bottles and phials for pharmaceutical purposes, jars and bottles for preserves, etc.

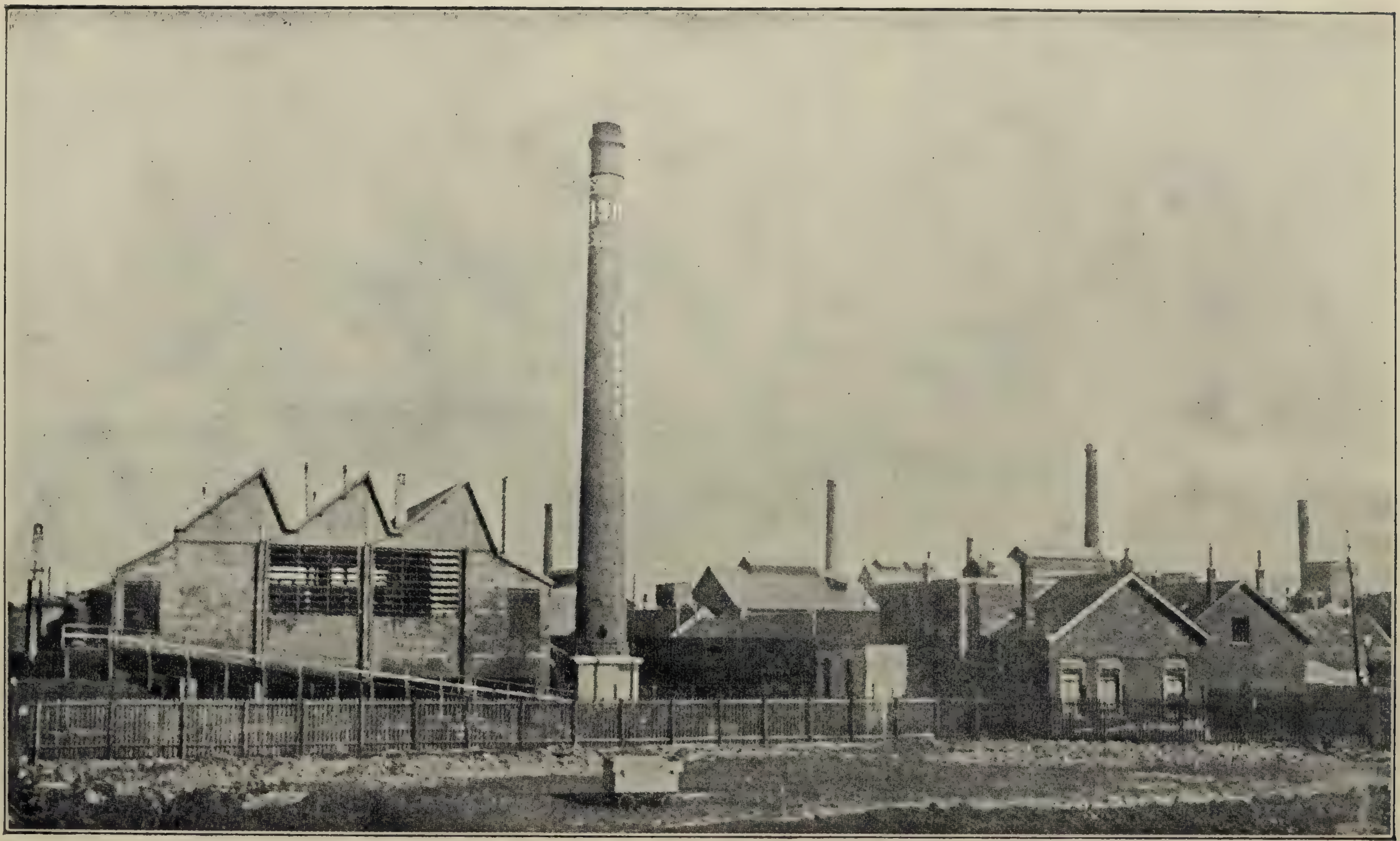
The annual output of these works is valued at over £ 240,000. The greater part of this output is exported, to among other places Great Britain, Belgium, the Netherlands Indies, the Argentine, etc.

Bottle-making is an important branch of the Netherlands glass industry. This trade may be rightly termed an export trade, for that portion of its wares which goes abroad is of particular importance and represents, in the case of some of the factories, nearly half their total output.

But The Netherlands herself also uses a considerable quantity of bottles for her distilleries, her wine trade, her breweries, her preserve factories, her perfumeries, etc. For this reason, there are several glass-works in the country which manufacture nothing but bottles (black, green and white). A few distilleries (two at Schiedam and one at Culemborg) have their own glass-works which make the bottles for their products, while 2 distilleries at Rotterdam, 1 at Schiedam and 1, of very great importance, at Delft, have an interest in glass-works at Schiedam and Delft.

There are 10 glass-works making trade bottles at Capelle-on-Yssel, Delft, Leerdam, Nieuw-Buinen, Nieuwerkerk-on-Yssel, Rotterdam, Schiedam (two), Vlaardingen and Zwyndrecht.

The majority of these works, which, among them, employ about 2,300 hands, have thoroughly up-to-date plant;



View of a bottle manufactory at Schiedam.

and their equipment has attained a high degree of perfection from the technical point of view.

The total output of the bottle factories in The Netherlands that work for the different trades amounts to 70 million bottles a year, which is equal to one-twentieth of the total annual output of all the firms belonging to the European Syndicate of Bottle Manufacturers, the so-called "Europäischer Verband der Flaschenfabriken." The value of this output is over £ 500,000. The three factories that make bottles for their own use are estimated to turn out a further 20 million bottles annually.

Of these 70 million bottles, about 20 millions are exported, principally to Great Britain, Belgium and Canada.

A special branch of the glass trade is the manufacture of stained-glass windows, in which The Netherlands excelled in past centuries. We have but to recall the celebrated windows by the Brothers CRABETH in the church at Gouda. At present, some of these workshops still exist at Delft, Haarlem, The Hague, Rotterdam, Ruremonde (3) and Utrecht (2).

Lenses for optical instruments are ground in a factory of instruments of precision at Utrecht.

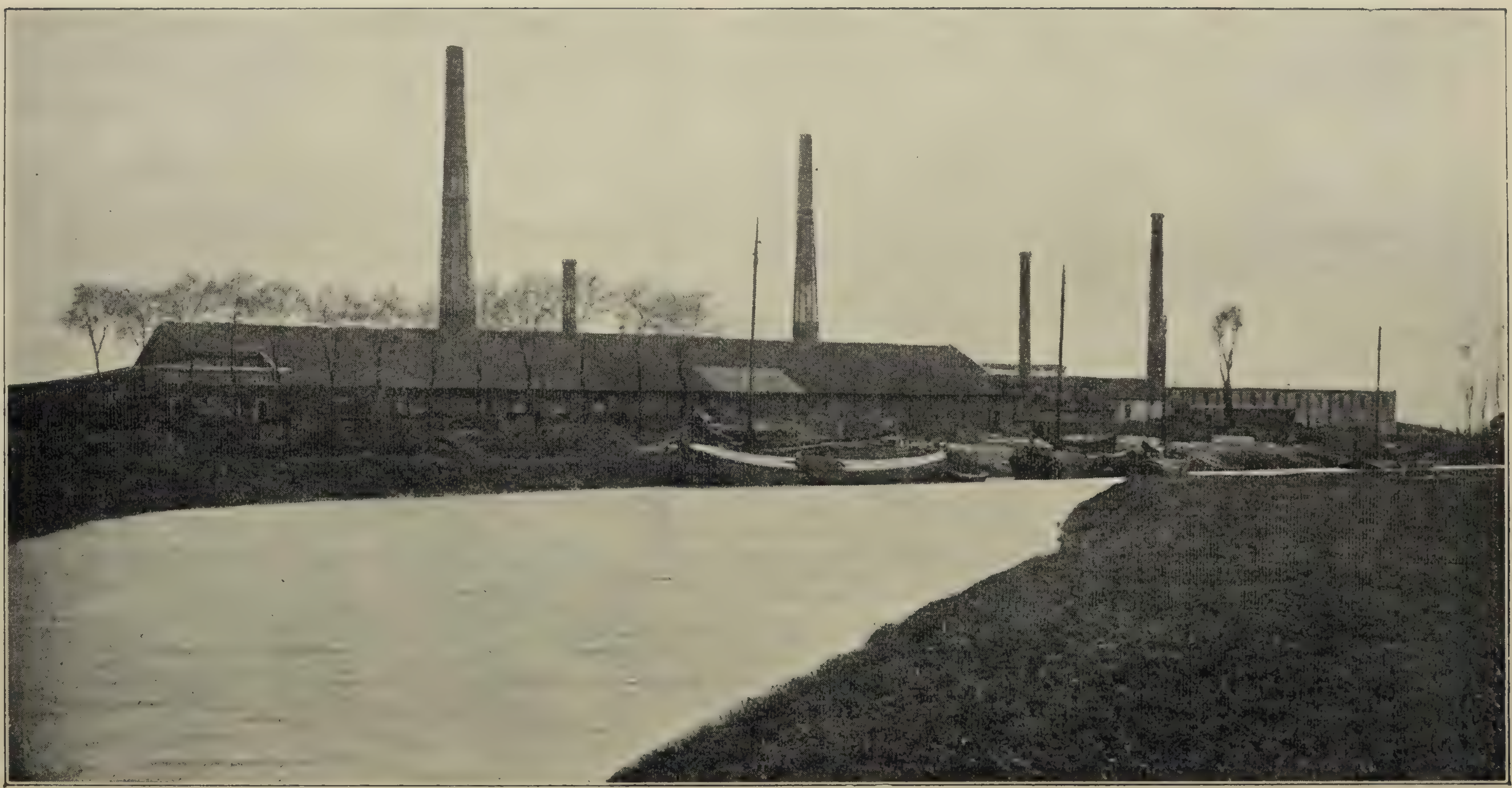
V. BUILDING MATERIALS.

BRICKS.

No stone is quarried from Netherlands soil, except in South Limburg; for there are no surface quarries, a fact which makes the finding of natural stone difficult. On the other hand, alluvial or diluvial clay is found in abundance, either on or immediately below the surface. Hence the absence of natural stone has never been very much felt.

The use of natural stone of all kinds has always been limited to the absolutely necessary, as the material had all to be obtained from abroad, which of course increased the cost.

Bricks, on the contrary, have become of general use for building in the country and have held their own for centuries, without even having to face any serious attempt at competition. It was only in the second half of the nineteenth century that this national product saw serious rivals arise in



View of a large brick-works at Haaften (on the River Waal).

the form of other building materials, such as limestone and sandstone, lime-bricks, compressed concrete and reinforced concrete.

In nearly all the districts containing the raw material there were found long-established brick-fields, often in combination with tile-works; and this on diluvial as well as on alluvial soil. Brick-making has become an important branch of industry mainly alongside the rivers and also in those parts where potter's clay is found.

In all, there are about 600 brick-fields and tile-works in The Netherlands, occupying a total of 21,000 workers.

There is a great difference between the various sorts of clay of The Netherlands. All these are made into wares no less dissimilar; and they are chiefly recognisable by their colour.

The most important two kinds manufactured are Waal bricks and Yssel bricks. The first are red and the second yellow; but the names indicate not only the place of origin and the colour, but also the dimensions. The majority of the firms engaged in this business have, of late years, manufactured by machinery. Only a few rare brick-works still make bricks by hand.

The principal products of the Netherlands brick trade are: bricks for masonry and pavements; besides these, hollow bricks, ornamental bricks and fire-proof bricks are manufactured.

Bricks are very extensively used for pavement purposes in The Netherlands; and the particular attention of those abroad who have to care for the paving of streets and roads may be drawn to this material.

Hollow bricks are extensively used in the building of chimneys. There are 7 works which make a speciality of the building of large chimneys for factories; they employ about 300 hands.

Ornamental bricks comprise profiled bricks, Bricorna and terra-cotta. In the second part of the last century profiled bricks became the fashion in The Netherlands; and when, about 1880, various manufacturers began to make use of the new press especially constructed for this purpose, these bricks became still more popular, being more easily obtainable. It

Partial view of the same brick-works at Haaften.

is from that time also dates the use of bricks, compressed after drying, and the masking bricks (glossed and strongly-pressed bricks of all colours) which are manufactured, among other places, in the large brick-works of Alphen on Rhine, Baarle-Nassau, Blerik, Bolsward, Delthuizen, Dokkum, Druten (on the Waal), Franekeradeel, Geertruidenberg, Gilze Ryen, Groenlo, Haaften, Heteren (on the River Waal), Kerkrade, Leiderdorp, Maasniel (near Roermond), Oegstgeest (near Leyden), Oud Vroenhoven (near Maastricht), Rheden, Sneek, Tegelen (near Venlo), Udenhout (near Tilburg), Veendam, Venlo and Winterswyk. The Bricorna bricks, coloured masking bricks with patterns in dead relief, also deserve special mention. In respect of terra-cotta building ornaments, the Netherlands industry is beginning to develop; some brickworks make these goods as a secondary branch of their manufacture.

The brick trade works in the first place for home requirements, and secondly for export to the Netherlands Indies and the United States.

LIME BRICKS.

The industry engaged in manufacturing bricks out of lime and sand under high pressure began in The Netherlands when the first manufactory of this building material was founded in 1898. Since that date, 16 other manufactories of this product have arisen, each of which produces a different article. In 1913, the 17 factories produced, in all, about 80 million bricks, which as a rule have the ordinary shape of the Waal bricks, but can be made in any desired shape.

Although this industry is of quite recent date in The Netherlands, it has at least this merit, that it is equipped in the most modern manner. Some factories use river sand, others that of the dunes and others again employ heath sand.

CEMENT WARE.

As long as 25 years ago, bricks were manufactured of gravel and Portland cement in a factory at Vryenban (near Delft), where this manufacture was carried out by means of hydraulic pressure. But the competition of bricks made from clay proved too strong; and this branch of industry disappeared within a few years.

Nevertheless, since the invention of very practical hand-presses, the trade has revived. It also happens now that the sand is taken from the soil on the very spot where the building is being carried on, with a view to making cement bricks, which are then often used as building material.

The mixture of Portland cement with fine gravel is especially adapted to the making of sewers, sewer entrances and other works of this kind and to the manufacture of paving-bricks and tiles. The trade engaged in the manufacture of these cement wares has developed more powerfully than that which only makes cement-stone for masonry. We will return to this subject when dealing with paving tiles and roofing tiles. For the moment, we must call special attention to the great importance of the branch of this industry which is specially engaged in manufacturing oval drain-pipes and other similar materials for the making of sewers, strengthened or not with iron braces. This branch plays a preponderating part in the works of extension and modernisation in the large towns, as well as in the erection of large buildings.

In all, there are 40 manufactories of cement goods in The Netherlands.

ROOFING TILES.

This industry has always been closely connected with the brick trade in The Netherlands. None the less, in the course of time an absolutely independent tile business has developed and now forms an important sub-division of the artificial stone industry, especially after a larger selection of raw materials and of resources and technical methods induced the different branches in this line also to specialise.

At the present moment, The Netherlands produce baked tiles, which consequently come under the brick trade, and also tiles manufactured by hydraulic pressure, which come under the heading of concrete.

Among the various sorts of these tiles, the most used are the so-called Netherlands tiles or S-shaped tiles, which are found in the trade as red, blue, or smoked (black or deep marine blue) and varnished; the flat Frisian tiles from Oegstgeest and Makkum; and the tiles known as grooved or self-fitting tiles, also called Echt tiles: varieties whose names indicate the original source.

Cement tiles are in increasing demand. They are made by hand in various concrete works.

The total number of factories making roofing tiles, is about 150, employing 3,000 hands, most of which (about 60) are in the province of Limburg.

The manufacture of roofing tiles is not carried on exclusively to supply the requirements of The Netherlands, but also for export. As against 13,794,262 kilograms imported in 1913, we find in the same year 26,984,144 kilograms exported, principally to Belgium (16,155,008 kilograms) and Germany (6,488,770 kilograms). South Limburg manufactures principally for Belgium.

PAVING TILES.

The paving tiles are made of cement and fine pit gravel; on the other hand, the facing-bricks are made specially of certain kinds of clay. The manufacture of the old Netherlands paving tiles, called "estriken" or "plavuizen", is usually part of the roofing-tile manufacture, as we have already stated. Side by side with these hand-made wares, which are now never used (save in the country), we find in the trade paving tiles of baked "fat" clay compressed by machinery. Among these are self-coloured tiles, called flooring tiles (ceramic tiles).

A single factory at Maastricht, employing 160 hands, manufactures hard paving tiles. Stone bricks for bakers' ovens (a Netherlands manufacture that has long enjoyed an excellent reputation and is exported far beyond the frontiers) are made at Alblasserdam, Borne, Leeuwarden, Oosterhout, Purmerend, Waddingsveen and Woerden.

Cement paving tiles of different kinds are made in The

Netherlands for the paving of side-walks and terraces as well as for indoor pavements. We thus find a paving tile factory in the "Stormpolder," near Krimpen-on-Yssel, at Alphen-on-Rhine and at Udenhout.

At Apeldoorn, Hattem and Winschoten there are factories of cement and granite paving tiles, called terrazzo paving tiles and mosaic paving tiles; at Maassluis there is a factory of asphalt paving tiles, obtained by a high pressure of limestone powder, asphalted hot; at Alphen-on-Rhine there are three factories making coloured cement paving tiles (so called flooring tiles), besides one at Flushing, one at Tilburg and one at Apeldoorn.

EARTHENWARE PIPES.

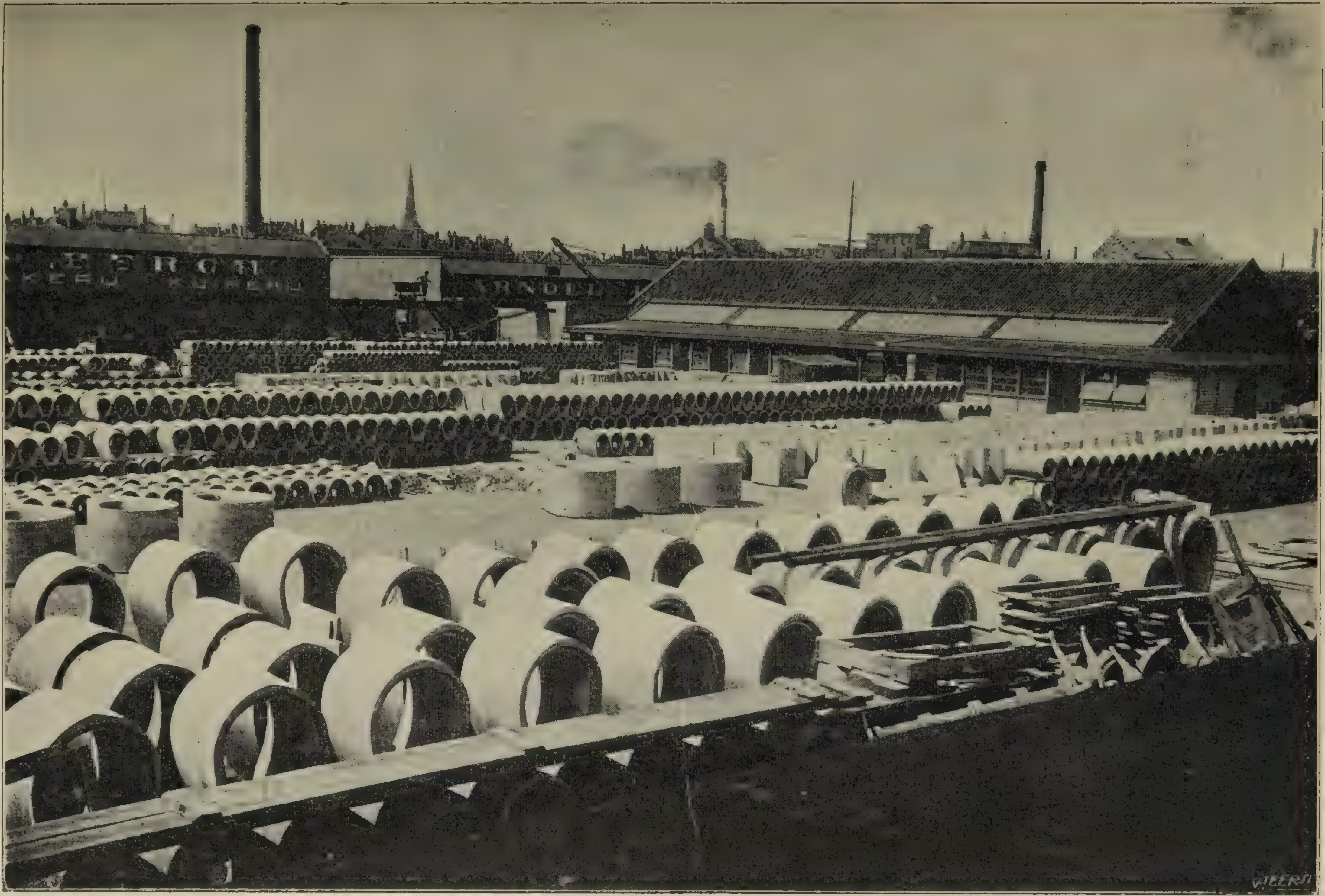
This industry includes drain pipes and sewer pipes.

The Netherlands also manufacture pipes of glazed mountain-clay sandstone, as well as pipes of baked and lead-enamelled river clay.

Some 11 works manufacture these articles, including 1 at Beesel, 1 at Bolsward, 1 at Belfeld, 1 at Deventer, 1 at Ouden Ryn, 1 at Oud Vroenhoven, 1 at Reuver, 3 at Tegelen and 1 at Utrecht, employing altogether over 420 hands. Three of these factories, the largest (1 at Deventer, 1 at Tegelen and 1 at Belfeld), have amalgamated and formed a limited company.

Rough unglazed drains are made in some twenty factories and little factories scattered throughout the provinces of North Brabant, South Holland, Friesland, Utrecht and Groningen: it is difficult to estimate the number of workmen employed.

Thanks to the improvement in the manufacture of this class of goods in The Netherlands, a great advance can be seen in the progress of this trade. Whereas but a few years ago The Netherlands employed hardly any but earthenware pipes from England, while the then existing factories in the country were able to expend only a small portion of their energy, we find to-day that the foreign article has been almost entirely superseded by that of home manufacture and



View of the yards of a manufactory of concrete and cement goods at Rotterdam.

that, in spite of the increase in the number of factories, they are well supplied with work.

LIME, TRASS AND PORTLAND CEMENT.

Of these three products, which serve to bind the mortar or the material for masonry work, The Netherlands produce chiefly lime and, more specifically, shell lime (so called from its origin, to distinguish it from mineral lime).

Shell lime is obtained by burning the shells fished up on the shores of the North Sea and the Zuyder Zee. The shell lime kilns are reckoned among the oldest of the industrial establishments in The Netherlands. As far as is known, this industry exists nowhere else, except in the Netherlands Indies.

The old Holland or Katwyk kilns, which were faulty in make and working, have been replaced, since 1860, by a pattern far superior in all respects and producing a much better article.

Over 40 of these establishments, with about 250 hands, exist in The Netherlands, the greater part of them being in Overyssel, Groningen and South Holland.

In 1913, the total production of shell lime was about 1,600,000 hectolitres It is sold only as slack lime. Of late years, it has also been used considerably as a fertiliser.

In the south of Limburg, where the soil contains mineral lime, arrangements have been made to begin extracting it.

From the earliest times, the trass of the Eifel has been greatly esteemed in The Netherlands for masonry work.

The suppression of the import duty on ground trass was the cause of the partial disappearance of this industry. At the present time, only some 10 of the trass mills survive.

REINFORCED CONCRETE.

The reinforced concrete industry has developed as extensively in The Netherlands as elsewhere. There are already several very important works (railway viaducts, bridges, factories and other large buildings) built of this material, which is also of such immense use in the department of hydraulic constructions and more especially for the defence works of coasts, jetties, etc.

Even abroad and as far afield as Chili, Netherlands firms have executed harbour works in reinforced concrete. At present, there are 20 establishments in The Netherlands which make a speciality of reinforced concrete, some of which also manufacture concrete wares.

"Visintini" and "Siegwart" beams have also caught on in The Netherlands. The first are manufactured in a large cement goods works at Rotterdam, which makes a speciality of them; the second in a works at Krimpen-on-Yssel. These are concrete beams which are taken ready-made from the factory to the yards, there to fill their place in the reinforced concrete structures.

Mention may here be made of the "De Muralt" system for coast defence, an invention of a Netherlands engineer, which is already largely employed abroad.

ASPHALT.

The Netherlands asphalt industry comprises only the manufacture of blocks (cakes) of asphalt, which are obtained by melting purified bitumen with asphalted powdered limestone; that of asphalt paving bricks; and asphalt street-paving, etc. Generally speaking, however, it is considered that the factories of asphalt paper for covering roofs, while forming a class apart, should also be included in this industry.

Not so long ago, this industry was only represented in The Netherlands by the Amsterdam branch of a foreign firm, which undertook the laying down and repairing of asphalt pavements in the large towns. But, during the last few years, a few Netherlands manufactories of asphalt cakes, of asphalt paving bricks, of asphalt paper and asphalt felt, for covering roofs and as an isolating medium against damp, have been established at Alphen-on-Rhine, Amsterdam, Dordrecht, Leeuwarden, Maassluis, Nymwegen (2), Princenhage, Utrecht (2) and Wyhe.

SLABS FOR PARTITIONS AND SANITARY FLOORINGS, STUCCO MOULDINGS, ETC.

In The Netherlands, as elsewhere, slabs are manufactured, under different names, intended principally to replace masonry partitions. At first, these articles were imported; but, as the demand increased, factories were founded, among other places, at Alphen-on-Rhine, Amsterdam, Bergen-op-Zoom, Breda, Leyden and Nymwegen. Materials for sanitary floorings (sanitary, because without joins), known as "Torgament," "Dolment," "Terrazzo," etc., are manufactured at Amsterdam, Arnhem, Deest, Dordrecht, Eindhoven, Leyden, Rotterdam, Sloten and Zwyndrecht, in factories which had very humble beginnings. In general, the trade producing these modern building materials is developing, although it often happens that an article disappears from the market as quickly as it is introduced, leaving no trace behind it but its more or less pretentious and mysterious name.

The works where modelling clay is prepared for art schools, the applied arts and architecture are at Amsterdam and Bois-le-Duc.

STONE-HEWING WORK; ARTIFICIAL GRINDSTONES.

The natural foreign stones that are most used and worked in The Netherlands are free-stone, marble, granite, sandstone and limestone.

As a rule, stone-dressing is an industry of little importance in The Netherlands. There are a few establishments, however, where the stone is sawn, planed, polished, etc., by machinery, both for hydraulic structures and the like and for sepulchral monuments, mantelpieces, washstands, etc. In all there are about 45 large workshops for the cutting and polishing of stone in The Netherlands, the most important of which are at Amsterdam, Rotterdam, The Hague, Bloemendaal and in the south of the country, at Bois-le-Duc, Tilburg and Maastricht. They work mostly for the interior.

Grindstones are also an article produced by these workshops; but, for this purpose, artificial stone is a powerful competitor of the natural material. There are some twelve artificial grindstone factories in The Netherlands. They export on a large scale to all the European countries, as well as to Africa and to Asia Minor.

VI. THE TIMBER TRADE AND ALLIED INDUSTRIES.

The Netherlands were originally very rich in timber; but an enormous amount was cut, in the course of time, and no provision made for the creation of new plantations, with the result that this source of national wealth became exhausted.

During the last twenty-five years, however, the area of woodland in The Netherlands has gradually increased.

This is due to the clearing of waste lands on every side under the auspices and on the initiative of The Netherlands Heath Company (*Nederlandsche Heide-Maatschappij*). In 1833, only 169,026 hectares were wooded; but, by 1913, the total area had expanded to about 300,000 hectares.

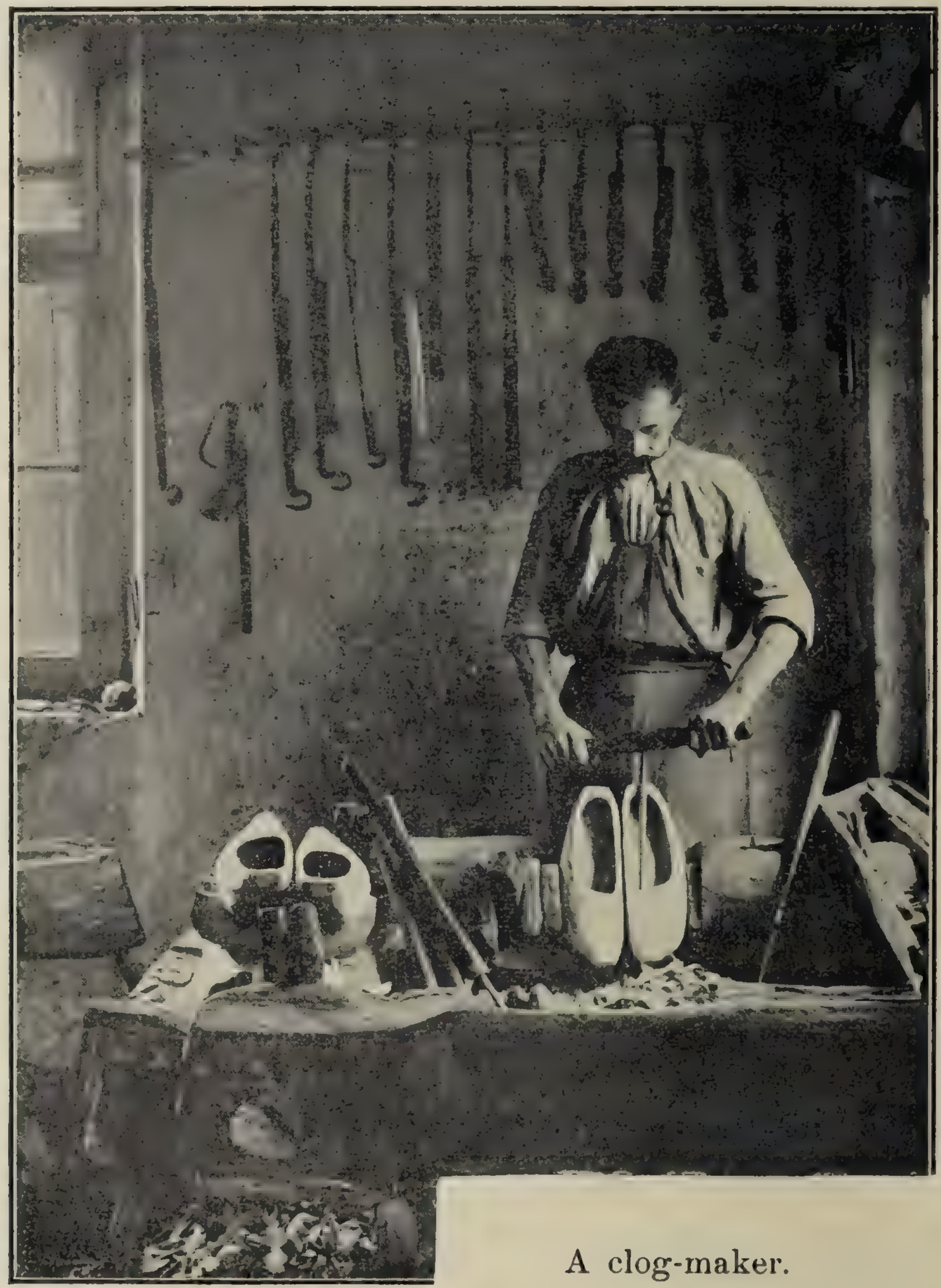
One thing is certain, that the afforestation will be continued in at least the same proportion as above; for, nowadays, not only the State and the various provincial and local authorities, under the guidance of the Department of Woods and Forests ("Staatsboschbeheer"), but likewise many landed proprietors are devoting their attention, not only to a rational cultivation of timber, but to the breaking up of such sandy wastes as appear suitable to the growth of leafy and resinous trees.

The greater part of the woods consists of resinous trees, covering about one half of the total woodland area. The remaining portion is composed of various kinds of trees, such as beech, oak, ash and elm.

For the most part, this wood is used in The Netherlands itself, for building purposes, or for the manufacture of furniture, wooden shoes, &c. The resinous sort is exported in appreciable quantities to Belgium and Germany, where it is mostly used in the mines.

Despite the increased afforestation of the last decades, there is a growing demand for foreign timber in The Netherlands.

This demand, however, has existed for centuries. In the heyday of the country's trade with northern countries and Baltic ports, timber was one of the principal items which the Netherlands vessels accepted there by way of cargo.



A clog-maker.

It so happened that a great deal more timber was imported from these countries that was required for local consumption; and this was the origin of an important trade, which, though it has fallen off somewhat in the course of years, has always remained considerable.

The Netherlands Statistics of Import, Exports and Transport give the following figures for the general imports and exports of timber during the past twenty-four years:

IMPORTS AND EXPORTS OF TIMBER IN THE NETHERLANDS FROM 1890 TO 1913

(timber of every description, excepting dyers' woods, in tons of 1,000 kilograms).

Year.	General Imports.	General Exports.
1890	860,826	350,154
1891	925,655	393,877
1892	1,126,611	423,757
1893	975,153	412,587
1894	1,135,838	513,905
1895	1,145,150	510,272
1896	1,247,191	565,841
1897	1,613,793	830,313
1898	1,596,066	944,580
1899	1,666,629	914,020
1900	1,737,578	938,813
1901	1,609,009	903,271
1902	1,704,327	823,651
1903	1,954,577	1,026,282
1904	2,171,538	1,231,937
1905	2,233,910	1,231,235
1906	2,517,638	1,390,349
1907	2,407,588	1,540,043
1908	2,792,316	1,782,544
1909	2,624,689	1,621,173
1910	2,709,743	1,377,728
1911	2,927,737	1,469,603
1912	2,888,523	1,361,126
1913	2,815,029	1,219,359

It will be seen from the above table that, during these twenty-four years, the consumption of wood has considerably increased and likewise that the carrying trade in this material is a very important one in The Netherlands.

The timber trade of the northern part of the country is becoming more and more confined to the ports of Amsterdam and Zaandam; while for the southern part Rotterdam is the principal port of importation.

In former days, Germany supplied The Netherlands with enormous quantities of timber. Rafts of astonishing dimensions, known as "Holländerflösse," built of trees from the forests adjoining the Rhine, used to descend that stream. These huge rafts were composed of a large number of smaller rafts, which had come down the tributaries to the Rhine, where they were joined together.

The materials were principally oak, beech and pine; and the rafts usually remained intact as far as Dordrecht, where they were broken up, after which the trees of which they were formed were sold at public auction.

Dordrecht was for ages the mart for all the Rhine timber, which was thence distributed, the oak going principally to the centres containing the shipbuilding yards.

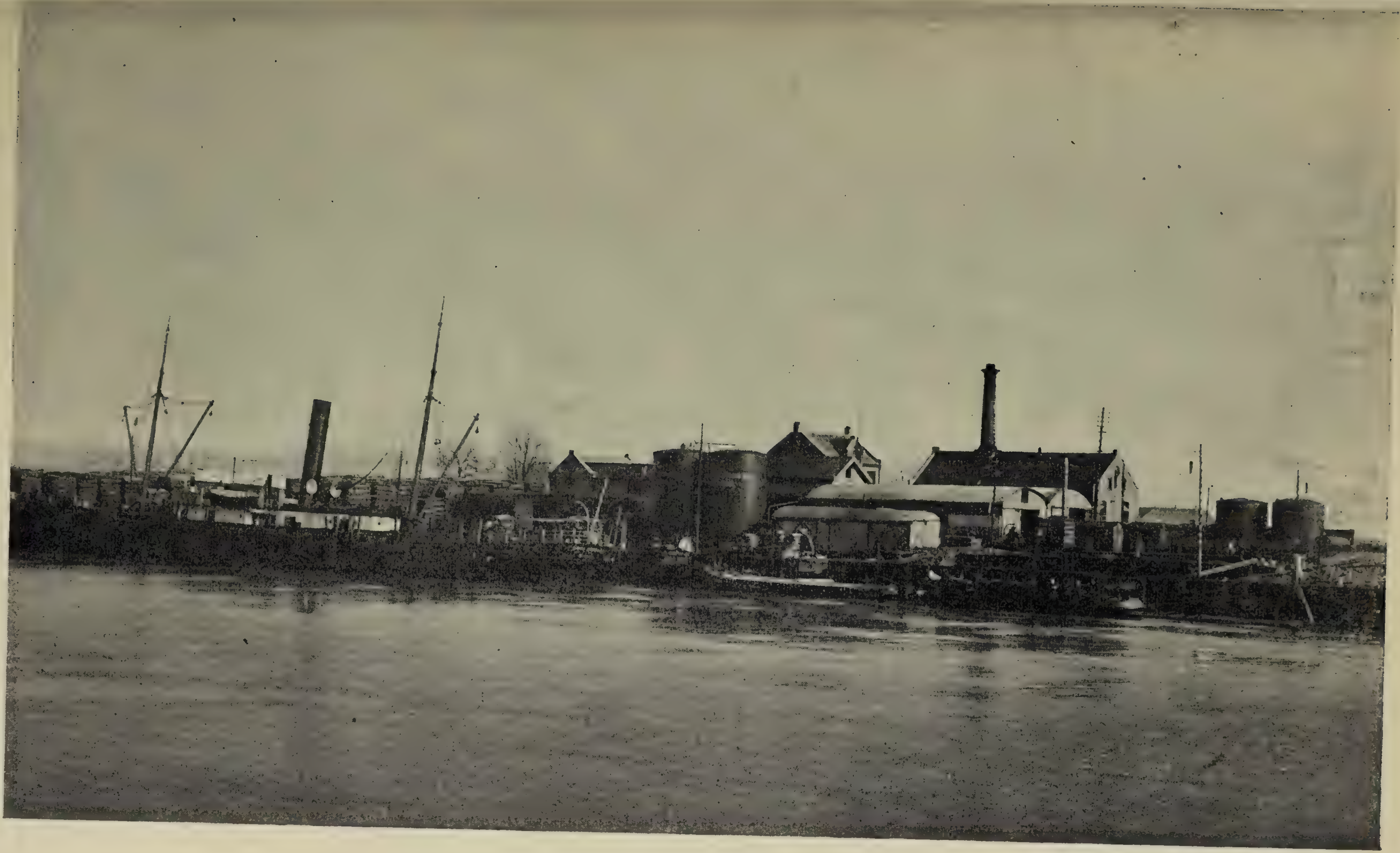
Even nowadays, a great many rafts come down the Rhine; but this wood is bought or ordered in Germany by Netherlands merchants and only very rarely travels as far as Dordrecht or Rotterdam, being distributed before it arrives there, in the various minor harbours on the way.

The decrease which we observe in the importation of Rhenish wood is due to the fact that Germany herself is short of timber and consequently begins by consuming her native supplies.

Rotterdam and Dordrecht are now the ports marked out for the importation and transhipment of American, Scandinavian and Russian timber.

The timber which arrives by sea in the different ports of the country may be classed under the following heads, according to the uses for which it is intended, namely:

Timber for building purposes; timber for railway work (sleepers), stakes and piles; cabinet wood; wood for



View of a timber-preserving establishment at Dordrecht.

the manufacture of paper, packing cases, casks, wooden shoes and matches; timber for mines; and *dyers' wood.*

We have already stated that timber was always the object of large commercial transactions in The Netherlands. It should be added that it forms an item of primary importance in a number of industries such as those concerned with *timber preservation, saw-mills, wood-turneries, planing works, furniture factories, wheelwrights'* and *carriage works, coopers' works* and factories of *packing cases, wooden shoes, baskets* and *hampers, hoops, brushes* and *brooms,* &c.

The industry most closely allied to the timber trade is that of *timber preserving,* where the wood is specially treated for employment in railway construction (sleepers) and such hydraulic works as dyke-making, groining and the construction of dams, quays and pallisades under water, piles, &c.

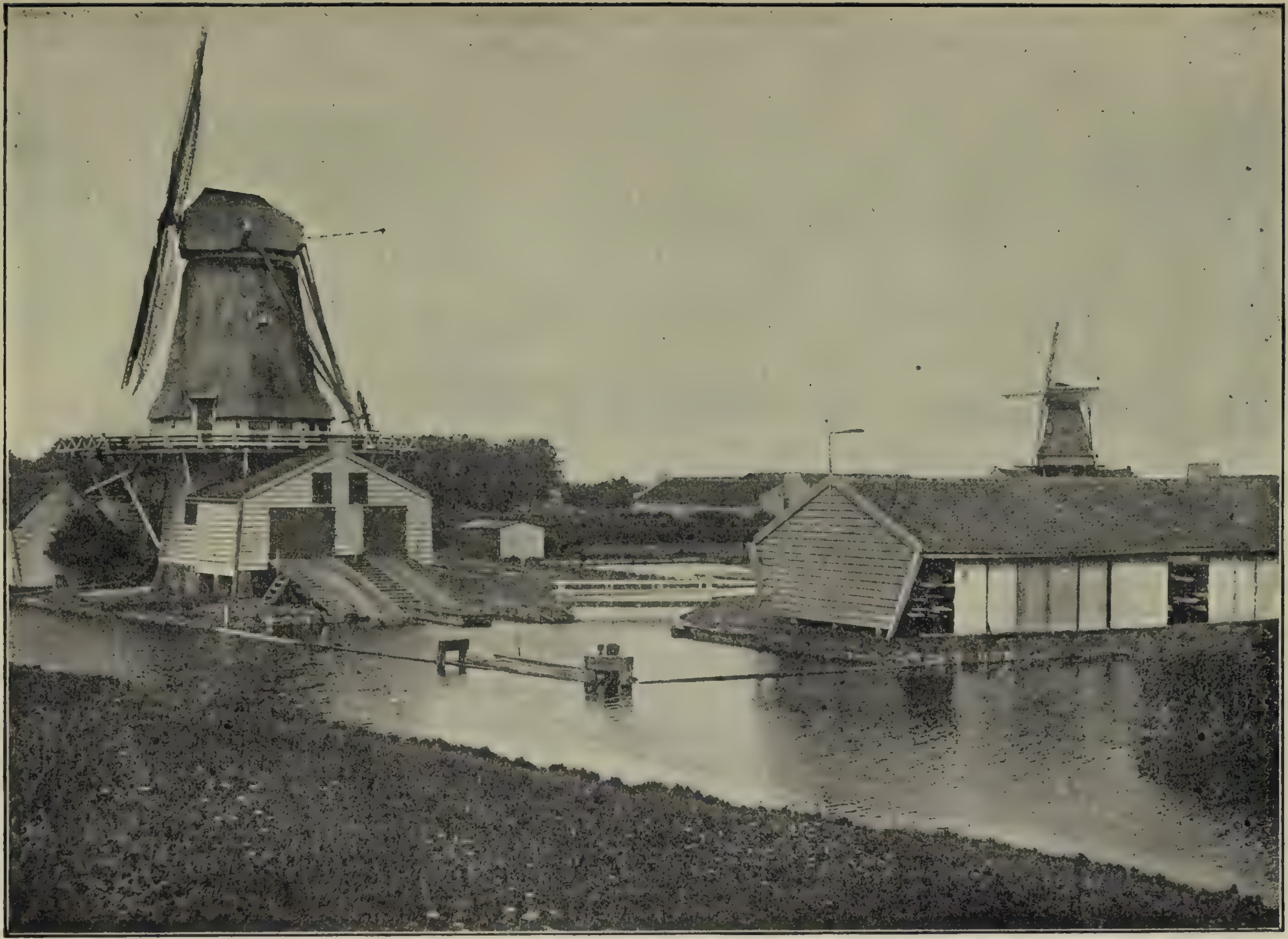
The Netherlands is so rich in waterways that she has no lack of opportunities to test the different methods of *timber preserving* invented. The most noteworthy are that which consists in treating timber with creosote; BURNET's process; and kyanization. For telegraph poles, the old method of impregnating the wood with vitriol (*sulphate of copper*) is still preferred.

The great economic and technical advantages attached to the prevention of decay in timber caused nine establishments dealing exclusively with that matter to be founded in succession. Moreover, the two large railway companies in The Netherlands, namely, "the Company for working the State Railways" and "the Holland Railway Co.", each possess a special department for the treatment of the timber which they employ.

One of the nine private firms has, of late years, worked principally for firms abroad. Large quantities of timber come to Dordrecht, where this firm is established, and, after undergoing its treatment, go back abroad again.

Several large European railway companies, as also some colonial railways, have had their lines built entirely with sleepers of European (Russian) timber treated by this firm and are its principal customers for this article of export.

The telegraph posts prepared in the country are also



Wind sawing mill on the Zaan.

often exported; and it may be safely said that The Netherlands have succeeded in securing a notable place in the markets of the world through their preservative treatment of timber.

The raw timber destined for employment in The Netherlands for building purposes or cabinet-making is dressed (sawn, planed, &c.) in the country, according to the purpose for which it is needed.

For centuries, the Zaanland (the district around Zaandam) was an important centre of the timber trade and industry. All along the wide canals of this flat country, in former days, stood hundreds of wind-mills: oil-mills, flour-mills and saw-mills. To-day, there are still 25 *saw-mills* in Zaandam alone; but of the old wind-mills there are very few left.

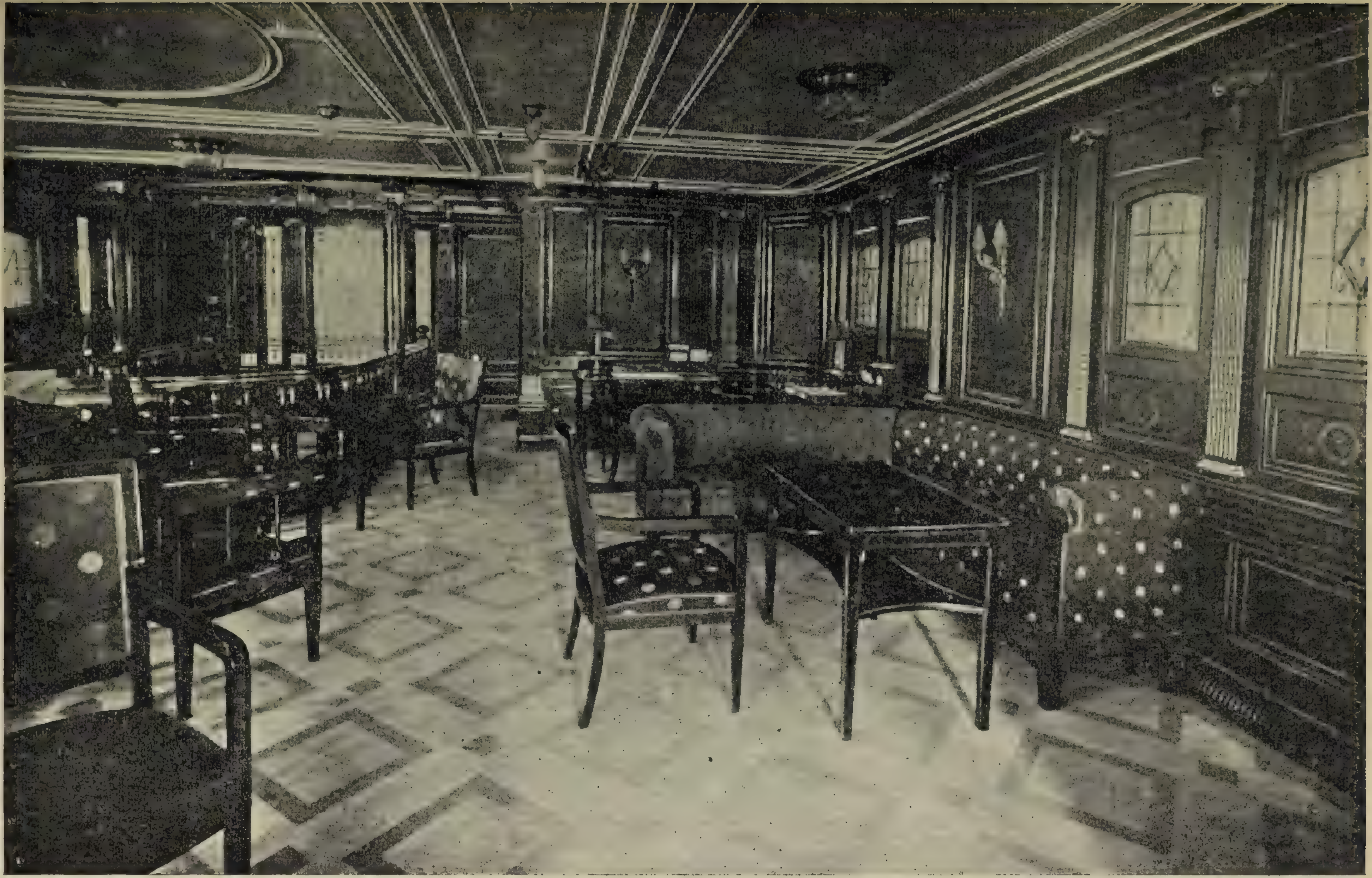
The timber is sawn either at the timber merchants' or at the sawyers' working to order. Saw-yards are very numerous in The Netherlands and are distributed all over the country. They are found mostly on the banks of the rivers or canals, where the timber is carried easily and cheaply.

Important saw-mills with timber-yards attached to them exist in the Zaanland and at Harlingen, Meppel, Steenwyk, Deventer, Zwolle, Arnhem, Utrecht, Amsterdam, Delft, Dordrecht, Leerdam, Rotterdam, Ysselmonde, Schiedam, Zevenbergen, Klundert, Middelburg and Stratum: there are about 400 in all, employing about 5,000 workmen.

The timber trade and the saw-mills are mostly centred in North and South Holland.

Although the *shaping of timber* for the various purposes of the building trade is still largely done by hand, the last five and twenty years have witnessed the birth of factories specially engaged in turning out door-frames, window-frames and sills, wainscotting, with ogee and other mouldings, staircases, with bannisters, school and church furniture, &c., the whole completely finished and mounted ready for fixing.

There are about 85 of these factories, large and small, in The Netherlands, employing about 2,100 workmen. They nearly all work by machinery, the motive power being steam, gas or electricity.



The "Social Hall" of a transatlantic liner, the woodwork of which has been executed by a Rotterdam furniture manufactory.

As with carpentry, *cabinet-making* long remained a trade carried on entirely by hand. In many cases, it is still so carried on, not only in the provinces, but also in the large towns, *e. g.*, Amsterdam, which contains a great number of small cabinet-makers working on their own account, who, either with or without the help of artisans, make cupboards, expanding tables, or smaller wooden articles. At The Hague, the chair-makers are numerous; and Rotterdam supports a number of table makers.

The various parts which these home workers use in their business (they supply plain, inexpensive goods to the wholesale traders and merchants and to the retailers in the large towns) are usually prepared in the saw-mills.

Side by side with this domestic industry (the number of workers employed in which it is difficult to estimate even approximately) we find in The Netherlands a certain number of important cabinet-making firms which devote themselves to the production of better-class furniture, decorative furniture, &c. Some of these are equipped for furnishing houses from cellar to attic. They have talented designers and craftsmen on their staffs and make a speciality of supplying all that is required for the house, in the old or modern style, from models submitted, or from designs specially made to suit the taste or convenience of their customers. Most of these factories have large show-rooms, comprising suites of rooms completely furnished.

As a rule, indoor architecture and cabinet-making have attained a high degree of excellence in The Netherlands; and the home industries are able to satisfy the most refined demands from the point of view of luxury and comfort.

To realize this, we need only study the woodwork in the saloons and cabins of several of the large liners supplied by two Netherlands factories — one at The Hague, the other at Rotterdam — which specialise in this direction. This woodwork, which is supplied not only to the boats built in the Netherlands yards, but also to some of those built abroad, will bear very favourable comparison with that turned out in other countries. From the fact that this woodwork is daily admired for its artistic merit by large numbers of travellers,

The library on a transatlantic liner, the woodwork of which has been executed by a furniture manufactory at The Hague.

it is small wonder that Netherlands cabinet-making has acquired so high a reputation abroad.

The Flemish and Frisian Renaissance furniture is also greatly sought after in foreign countries, especially in France, Great Britain and the United States of America.

There are in all 280 furniture factories in The Netherlands, employing about 5,200 hands. The principal factories are found both in the large towns and in the country districts.

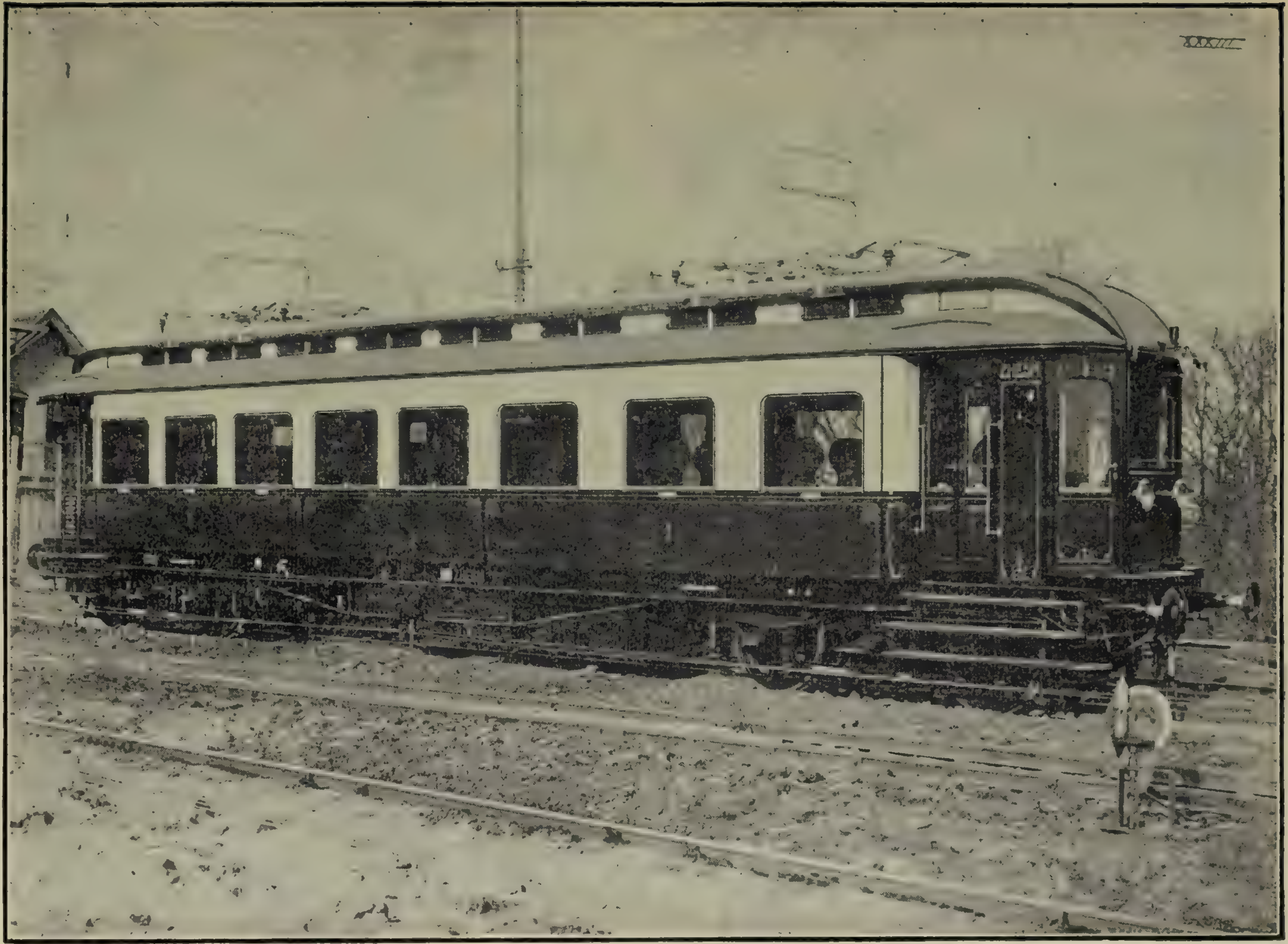
Nearly all these factories have their own *turneries*. Nevertheless there are factories that make a speciality of wood-turning. The furniture manufacturers give them work when large quantities of pieces of the same pattern are required.

Spread over different parts of the country are some 70 of these turneries, employing about 450 workers.

Some special branches of this industry may still be mentioned, viz. the billard-table works at Amsterdam, Groningen, Haaren and Tilburg; and the manufacture of bedroom suites in American or Norwegian red pine, of children's go-carts and perambulators, toys, &c., a very flourishing industry, in the village of Waddingsveen (near Gouda). Started originally by a few local carpenters, who wanted occupation during the slack season, this industry has gradually increased until to-day it provides in 15 factories work for about 400 people. The output finds its way to every part of the country. *Cane, bamboo and rattan* furniture is made in large quantities principally in special factories situated at Amersfoort, Amsterdam, Apeldoorn, Gendringen, Gorredyk, The Hague, Krommenie, Opsterland, Rotterdam, Uitgeest and Ulft.

In the north of the country, at Noordwolde (in the parish of Weststellingwerf, Friesland), there is an entirely separate industry, having nothing in common with those already enumerated. It is here that *willow*, *wicker*, *rattan*, *reed* and *cane* chairs are made, in more than thirty varieties. A clergyman, now dead, was the first to organise the professional teaching of this trade, which has since become a regular industry, furnishing constant work for about 500 people.

About 270,000 chairs are turned out yearly at Noord-



Motor carriage of the South Holland Electric Railway Co.
constructed by a Haarlem manufactory.

wolde, of which the greatest part is exported to France, Belgium and Great Britain.

Manufactories of gilt and coloured frames for looking-glasses, pictures, &c. are found at Amsterdam (5, employing about 400 hands), Arnhem, The Hague, Hengelo, Leyden, Rotterdam, Tilburg, Utrecht, Winterswyk, &c.

The products of the cabinet-making industry are principally exported to Belgium, Germany and Great Britain.

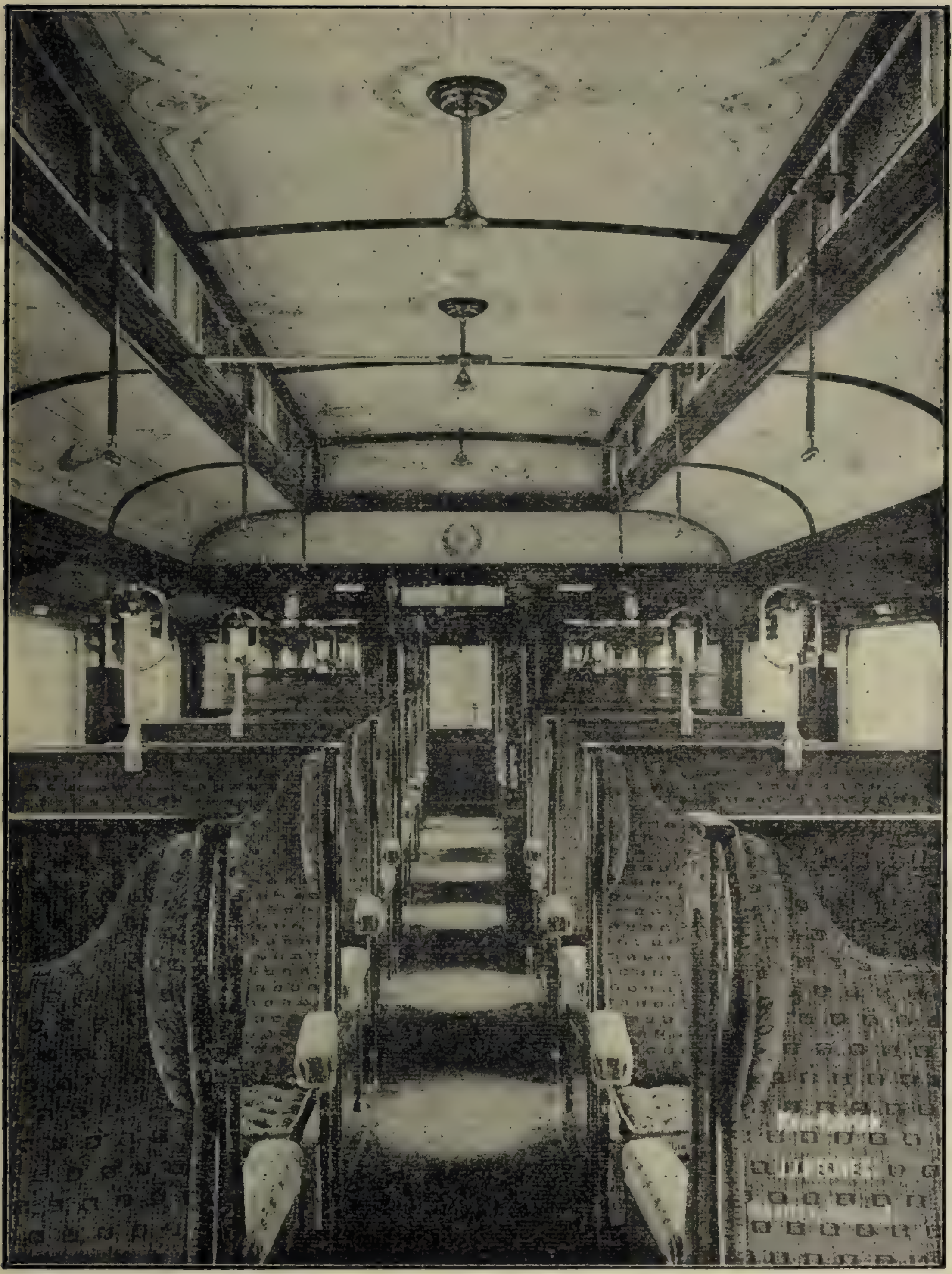
Whereas the *wheelwright's trade* has continued to be a small industry in The Netherlands, often being only a branch of the blacksmith's, joiner's, or cooper's trades, *carriage building*, on the other hand, has gradually become concentrated in large factories. The most important are at Amsterdam, Haarlem, The Hague, Bois-le-Duc, Moergestel, Tilburg, Franeker, Arnhem, Nymwegen, Zutphen, Doesburg, De Bildt and Maartensdyk. There are about 1,000 workmen engaged in this trade. It may be noted that, since the orders for horse vehicles began to fall off, the carriage-builders have taken to producing motor-car bodies also; and this branch is kept busily employed.

Two of these works, one at Haarlem, the other at The Hague, make a speciality of rolling-stock for railways and tramways.

For years, railway carriages have been turned out at Haarlem (as well as in a large machinery works at Amsterdam) for Netherlands and Netherlands Indian railway companies, including not only luggage vans and ordinary passenger coaches, but corridor carriages, restaurant cars, drawing-room cars, &c., in a word, a rolling-stock that satisfies every requirement of modern travel.

The same factory at Haarlem, a carriage works at The Hague and a large furniture factory at Rotterdam, are the principal firms that build the rolling stock for light local railways and for the municipal and intercommunal lines of electric tramways.

This branch of manufacture reflects the greatest credit upon the industry of The Netherlands, foreigners visiting the country being the first to praise the solid as well as elegant



View in a second-class carriage of the South Holland Electric Railway Co, constructed by a Haarlem manufactory.

construction of the railway carriages and tram-cars built in the country, as for instance, those of the South Holland Electric Railway Co., which works the Scheveningen, Hague and Rotterdam line, and of the Hague Tramways Co. at The Hague.

Cooperage also has gradually developed and taken its place among the recognized industries, turning out enormous quantities by machinery.

Most of the trades and industries requiring casks and barrels (such as the herring fishery and the breweries) are in South Holland; and the manufacture of those articles is therefore mainly centred in that province.

The principal cooperage works are at Rotterdam (7, employing about 700 hands), Schiedam (7, with about 110 hands), Vlaardingen (27 with about 650 hands), Maassluis, Amsterdam, Katwyk, Dordrecht, Leyden, Gemert, Oosterhout, Oss, Eysden and Meppel. All round, this industry gives employment to about 2,300 workers. As a number of articles which formerly were always packed in barrels are nowadays dispatched in boxes, the making of packing cases is often added to that of barrels.

The first-named industry, however, has a distinct branch for the manufacture of boxes used in the packing of butter, margarine, fruit, gin, cigars, &c. These factories are very numerous. At Rotterdam there are 11 with 700 hands and at Amsterdam there are 13 with 420 hands They are further found at Culemborg, Delft, Eindhoven, Goor, Gouda, Harlingen, Hengelo, Hillegom, Hoorn, Koog on Zaan, Oosthuizen, Schiedam, Stratum, Utrecht, Vlaardingen, Voorst, Weesp, Ysselmuiden, Zaandam, &c. Their produce is exported to every part of the world.

The making of *wooden shoes* in The Netherlands is done almost entirely by hand. It may be classed as a rural industry. There are only a very few factories where wooden shoes are turned out by machinery, namely, at Apeldoorn, Hoogezand, Alphen-on-Rhine, Oud-Beierland, Moordrecht, Diepenveen and Mill.

The other workshops are scattered pretty well everywhere, but mostly in the country and, more particularly, in North Brabant, where poplars and willows, growing on the banks of the brooks and the small streams, supply the material needed for this business. There are here at least 250 of these workshops, namely, at Best, Liempde, St. Michielsgestel, St. Oedenrode, Son and Breugel, Hooge Zwaluwe and Lage Zwaluwe. They employ about 800 hands. In Zeeland, the one village of Clinge, near the Belgian frontier, contains 25 of these workshops.

The products of this industry (which has no cause to complain of scarcity of work) supply, in the first instance, the needs of the country itself, which uses up nearly all the hand-made goods. The remainder and the greater part of the machine-made produce goes abroad, principally to Germany and North America, or to the colonies, especially to the Netherlands Indies.

One industry especially suitable to a low-lying country intersected with rivers, such as The Netherlands, is the cultivation of *osier*. This cultivation of the shoots of the pollard willows, which even in olden times was of some importance in The Netherlands, is largely seen in the stretches of land on the banks of the great rivers and in some particularly low-lying parts of South Holland and of the province of Utrecht: it is rarely met with on sandy land.

Willow-shoots are used in a number of petty industries, in the manufacture of hoops, baskets, chairs, fishing-tackle, &c.; besides which, enormous quantities are used in the making and repairing of embankments. Osier is mostly exported to Belgium, England, Germany, Norway and Sweden.

The trades which use osier as their raw material are usually to be found near the osier beds. Thus many manufactories of *hoops* exist to the north, south and east of the "Biesbosch" and in the "Lopikerwaard," two districts containing many osier beds. There are also several of these factories at Sliedrecht, Papendrecht, Giessendam, Hardinxveld, Ameide, Vianen and Werkendam. In all there are 75, employing about 1,000 hands. Besides these, there are 4 hoop factories at Raamsdonk, in North Brabant, with about 200 workpeople. At first, the proprietors of the osier beds ran

State school for fine basket-work at Noordwolde (Friesland).

the hoop factories themselves. Later, the trade fell into the hands of manufacturers; and even now the workmen buy the wood to work on their own account. From October to May, the hoops are made of green, unpeeled wood; during the summer, they are made of white wood, with the bark removed.

Part is sold in the country, to the coopers in fishing centres such as Vlaardingen, Maassluis, Scheveningen and Katwyk; a large portion is exported, principally to Belgium, France, Great Britain, Germany, Denmark, Sweden and Norway.

The manufacture of hoops is often found in conjunction with *basket-making*. This last is also carried on separately, as at Ameide, Ammerstol, Ammerzoden, Amsterdam, Apeldoorn, Bergambacht, Bois-le-Duc, Borgharen, Boskoop, Culemborg, Deventer, Elburg, Gameren, Haarlem, The Hague, Harderwyk, Jaarsveld, Kampen, Krimpen a/d Lek, Leerdam, Leusden, Rotterdam, Schiedam, Schoondyke, Schoterland, Tiel, Veenendaal, Vlymen, Utrecht, Wyhe, Wyk, Woerden, Ymuiden and Yselmuiden, which contain some 100 factories, with about 1,100 hands. The output of this industry, which in some towns is carried on by machinery, is disposed of mostly in the country itself, that is to the cotton mills and the herring-packers. The goods are exported to Germany, Scotland and Ireland. At Ameide, they mostly make little white baskets for the packing of the yeast manufactured at Schiedam and Delft.

The manufacture of *brushes* and *brooms* is a petty industry represented by about 30 factories scattered up and down the country, of which only a few are of any importance or make use of machinery, as for instance one at Amsterdam, at Rotterdam and at Winterswyk respectively and others at Apeldoorn, Arnhem, Assen, Bois-le-Duc (4), Culemborg (5), Delft, 's Heerenberg, Hoogezand, Hoorn, Leyden, Middelburg, Roosendaal, Weesp, Wildervank and Zwartsluis; altogether, 26 factories, with about 750 hands.

This line of wares is disposed of in Great Britain, France and the Netherlands Indies.

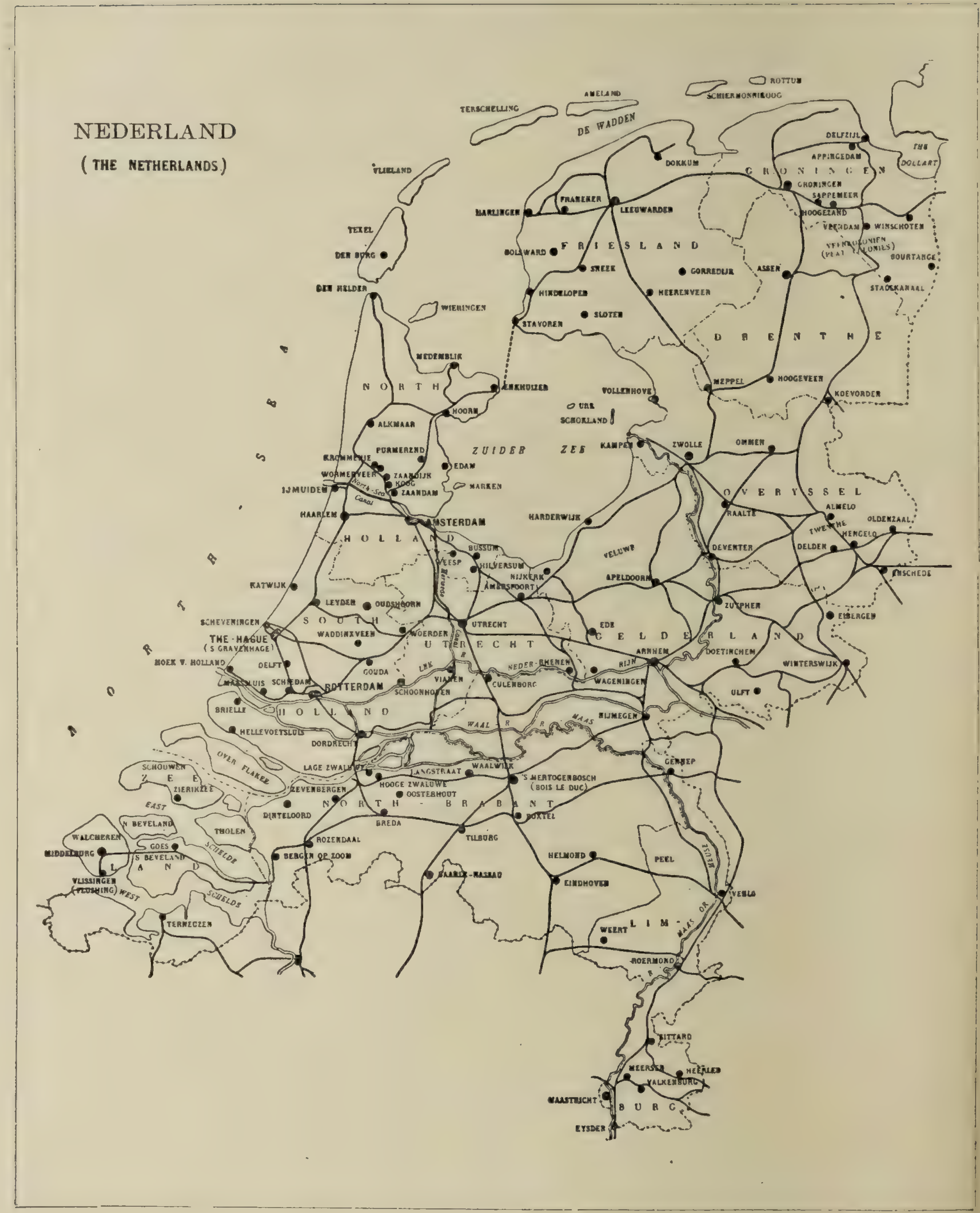
Straw-wrappers are made in 25 factories, with about

1,200 workpeople, and are exported to every country in the world, especially to Belgium, France, Great Britain, Netherlands India, the United States of America, Canada, South America, Australia and South Africa.

The *cork trade* is represented in The Netherlands by some 13 factories at Amsterdam, Rotterdam, The Hague, Arnhem, Dordrecht, Gouda, Nymwegen, Schiedam, Tilburg, Utrecht and Waddingsveen. It is principally engaged in the making of corks from the bark of the Spanish and Portuguese cork tree. These corks are used for the fisheries, in the wine trade, the beer and liqueur trades and the pharmaceutical trade. They are sold abroad as well as at home.

THE INDUSTRIES OF THE NETHERLANDS.

COMPILED BY THE COMMERCIAL DEPARTMENT OF THE
MINISTRY OF AGRICULTURE, INDUSTRY AND COMMERCE
WITH SPECIAL ASSISTANCE OF MR P. DOYER, SECRETARY
TO THE ROYAL NATIONAL RELIEF COMMITTEE.


NEDERLAND
(THE NETHERLANDS)
ROTTUM
AMELAND
SCHIERMONNIKOOG
TERSCHELLING
DE WADDEN
VLIELAND
TEXEL
DEN BURG
DEN HELDER
WIERINGEN
MEDEMBLIK
NORTH
ENKHUIZEN
HOORN
ALKMAAR
PURMEREND
KROMMENIE
WORMERVEER
ZAANDIJK
KOOG
ZAANDAM
EDAM
MARKEN
IJMUIDEN
North Sea Canal
HAARLEM
AMSTERDAM
HOLLAND
BUSSUM
WEESP
HILVERSUM
NIJKERK
AMERSFOORT
KATWIJK
LEYDEN
OUDSHOORN
SCHEVENINGEN
THE HAGUE
('S GRAVENHAGE)
SOUTH
WADDINXVEEN
WOERDEN
UTRECHT
GOUDA
DELFT
HOEK V. HOLLAND
MAASSLUIS
SCHIEDAM
ROTTERDAM
SCHOONHOVEN
VIANEN
CULENBORG
LEK
BRIELLE
HELLEVOETSLUIS
DORDRECHT
NORTH SEA
ZUIDER ZEE
HARDERWIJK
VELUWE
APELDOORN
EDE
GELDERLAND
ARNHEM
RHENEN
WAGENINGEN
NEDER RIJN
WAAL R.
MAAS
NIJMEGEN
HARLINGEN
FRANEKER
LEEUWARDEN
DOKKUM
BOLSWARD
FRIESLAND
SNEEK
GORREDIJK
HEERENVEEN
HINDELOPEN
SLOTEN
STAVOREN
GRONINGEN
DELFZIJL
APPINGEDAM
SAPPEMEER
HOOGEZAND
VEENDAM
WINSCHOTEN
VEENKOLONIEN (PEAT COLONIES)
BOURTANGE
STADSKANAAL
THE DOLLART
ASSEN
DRENTHE
MEPPEL
HOOGEVEEN
KOEVORDEN
VOLLENHOVE
URK
SCHOKLAND
KAMPEN
ZWOLLE
OMMEN
OVERYSSEL
RAALTE
ALMELO
TWENTHE
OLDENZAAL
HENGELO
DELDEN
DEVENTER
ENSCHEDE
ZUTPHEN
EIBERGEN
DOETINCHEM
WINTERSWIJK
ULFT
GENNEP
OVER FLAKKEE
SCHOUWEN
ZEELAND
ZIERIKZEE
LAGE ZWALUWE
LANGSTRAAT
WAALWIJK
'S HERTOGENBOSCH (BOIS LE DUC)
HOOGE ZWALUWE
ZEVENBERGEN
OOSTERHOUT
NORTH BRABANT
DINTELOORD
BREDA
BOXTEL
TILBURG
EAST
N. BEVELAND
THOLEN
WALCHEREN
GOES
SCHELDE
MIDDELBURG
S. BEVELAND
ROZENDAAL
BERGEN OP ZOOM
BAARLE-NASSAU
HELMOND
PEEL
EINDHOVEN
VLISSINGEN (FLUSHING)
WEST SCHELDE
TERNEUZEN
VENLO
MEUSE
MAAS OR
LIMBURG
WEERT
ROERMOND
SITTARD
MEERSSEN
HEERLEN
VALKENBURG
MAASTRICHT
EYSDEN

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N47lq
no. 50

THE INDUSTRIES OF THE NETHERLANDS.

COMPILED BY THE COMMERCIAL DEPARTMENT OF THE MINISTRY OF AGRICULTURE, INDUSTRY AND COMMERCE WITH SPECIAL ASSISTANCE OF MR. P. DOYER, SECRETARY TO THE ROYAL NATIONAL RELIEF COMMITTEE.

PART III.

CHEMICAL INDUSTRIES IN THE NETHERLANDS.

THE chemical trade, in the strict sense of the word, and the trade in articles chemically prepared have developed considerably in The Netherlands during the last few years. They have not failed to benefit by the great advance in the matter of applied chemistry.

The trade in all kinds of oils and fats is also very important. Rotterdam, for instance, is the principal market on the continent for oils and fats. The industries engaged in the manipulation of fat oils and solid fats are represented in The Netherlands by four important branches. These are the manufacture of oil, which includes that of oil cake for cattle, the manufacture of candles and stearin, of soap and of margarine (mentioned in part IV of this series).

A few of the chemical industries and branches of the oil and fat trade and allied industries which exist in The Netherlands are enumerated in the following pages.

SULPHURIC ACID.

An Amsterdam firm runs two factories in which sulphuric acid is made by two different processes and which produces both the highly concentrated and the less highly concentrated acid. A zinc factory at Budel also manufactures sulphuric acid, as do some chemical manure works, of which one at Capelle on Yssel may be mentioned. The others employ their produce for their own uses. (See illustration on pp. 8 & 9).

These factories easily find a market for their wares, both in this country and abroad, as for instance in Sweden, Norway, the Netherlands Indies and South America.

MATCHES.

The Netherlands match industry started in 1870 at Eindhoven, where the poplars which grow on the banks of the small streams, so numerous in the south-east of North Brabant, furnish the wood for wooden shoes and also supply the material for match-making.

At first, matches were made with white phosphorus and packed in round box-wood boxes.

Gradually, match factories were started at other places, as for instance, at Deventer, Amersfoort, Apeldoorn and Breda.

The process in use for the manufacture and composition of match-heads soon underwent changes and improvements. The so-called Swedish process was at once applied. In order to guard against the mutual competition which was injuring the trade, the Netherlands Match Manufacturing Co., Ltd., was founded in 1880 and incorporated all the factories except that of Breda. The factories at Deventer, Amersfoort and Apeldoorn were closed and the whole trade was centred at Eindhoven. To-day that town has a large factory, employing about 350 hands and producing some 400,000 boxes daily. In addition, there are two match factories at Breda, employing about 300 hands.

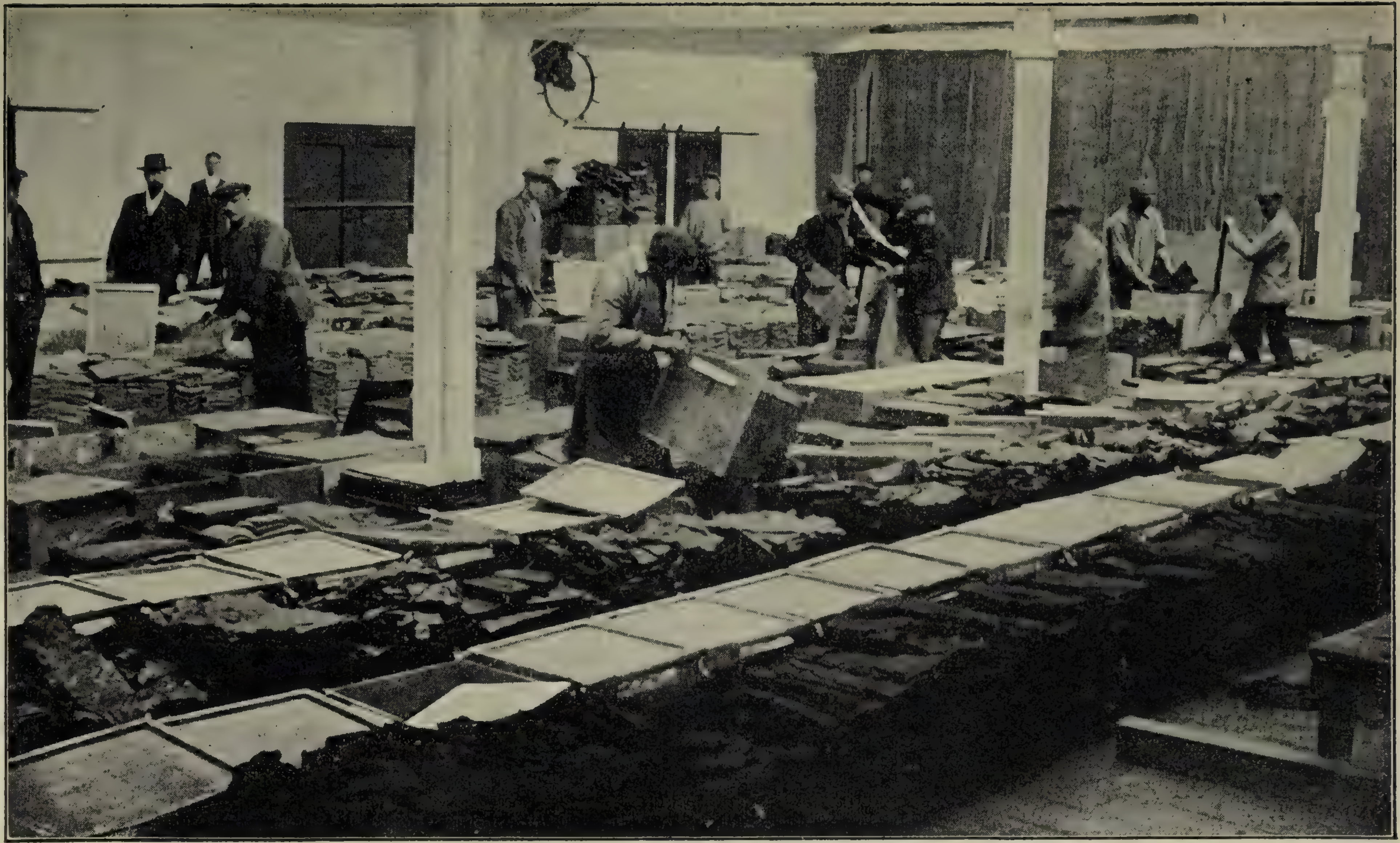
The use of white phosphorus has been forbidden in The Netherlands since 1901.

As regards the raw material, the wood is supplied for the most part by Russia, while the trust of English, German and French manufacturers supplies the red phosphorus.

Apart from The Netherlands itself, the matches are sold abroad in large quantities.

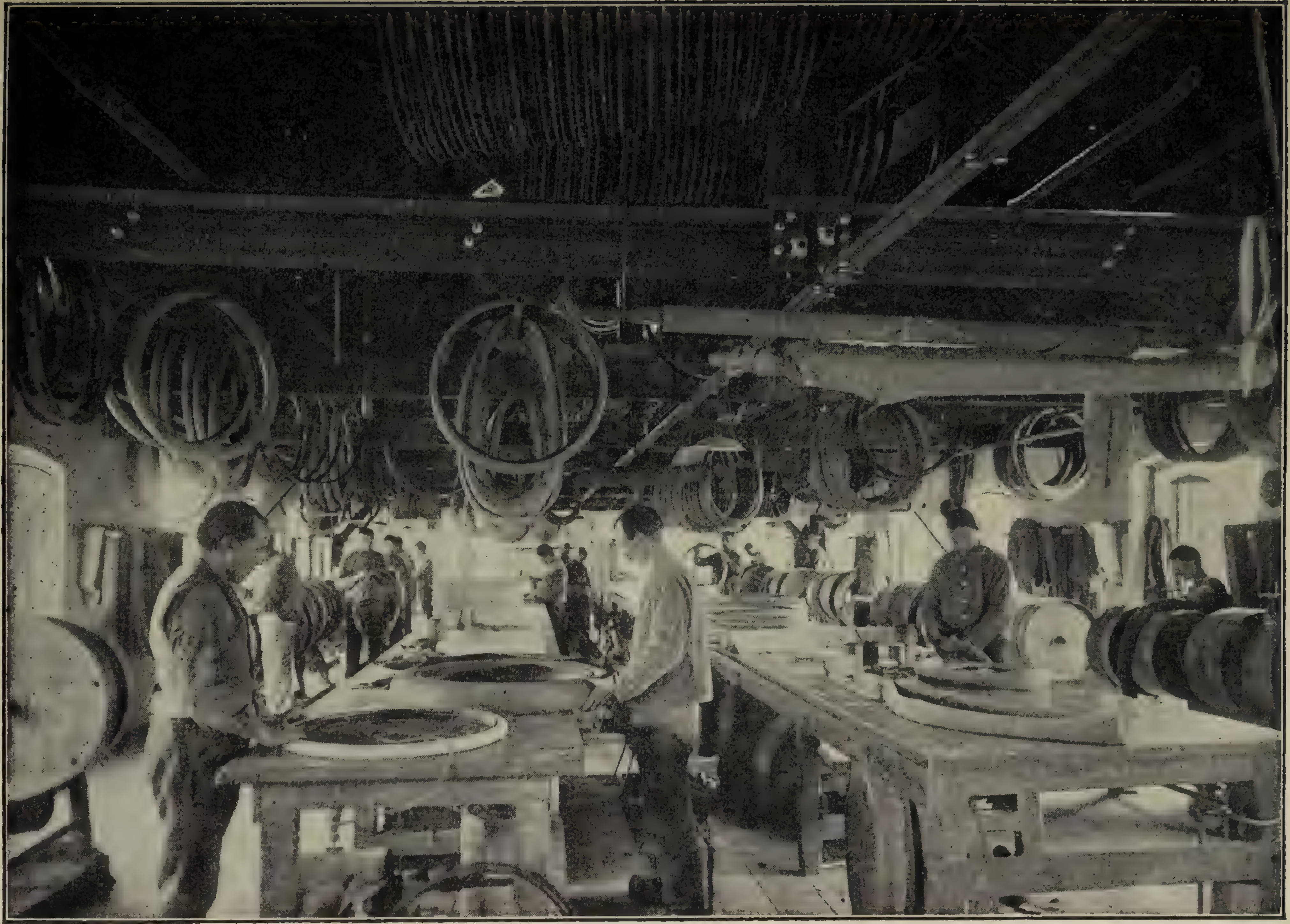
RUBBER, GUTTA-PERCHA AND BALATA.

Important manufactories of rubber, gutta-percha and balata articles for different purposes exist at Amsterdam, Haarlem, Loosduinen and Ridderkerk.



“First Central Rubber Establishment,” on the Handelskade at Amsterdam.
Repacking of the lots of rubber after sorting and description, in order to be stored again in the vaults.

rubber at Rotterdam



View of the bicycle tyres department in a rubber goods manufactory at Ridderkerk.

View of a Sulphuric

They all make *driving-belts, tubing, railway buffers, plugs, linings*, etc., whilst the Ridderkerk works devote themselves especially to the manufacture of *pneumatic tires* and *tire covers* for bicycles and carriages, and the Loosduinen works apply themselves to the manufacture of tires for motor-cars. They obtain the raw rubber, and their wares are entirely manufactured on the premises.

The Haarlem firm sent to the first rubber exhibition in London *rubber slabs* for paving purposes, at that time a novelty. These firms have of late occupied themselves with increasing success in the manufacture of *ebonite*, or hardened rubber.

There are also cable works at Amsterdam and Delft which use rubber and cognate products for isolation purposes.

actory at Amsterdam.

This industry, which is capable of further development, exports its products to, among other places, the Netherlands Colonies, Belgium, Great Britain and Africa.

Various kinds of rubber, gutta-percha and balata reach the Amsterdam and Rotterdam markets. *Balata* is a product from Surinam (Netherlands Guiana) and Central America which possesses several of the qualities of gutta-percha, but which also bears no little resemblance to rubber.

There are rubber markets at Rotterdam and at Amsterdam. At Rotterdam the forest product is mostly dealt in. At Amsterdam, on the other hand, the cultivated product of the plantations is mostly imported.

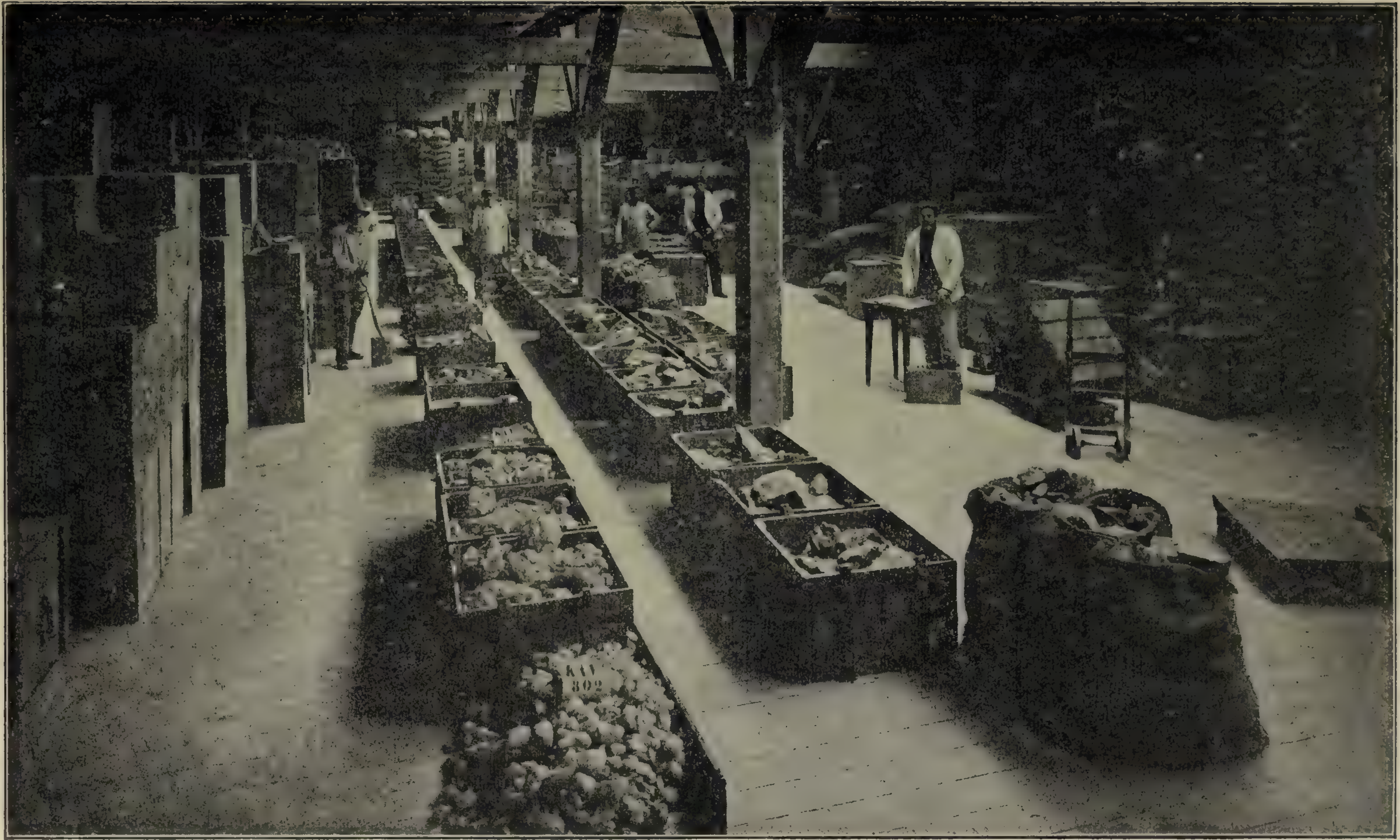
According to the Netherlands Statistics, the following were the imports and exports (special trade) of *rubber* in the years 1901 to 1913:

YEAR.	IMPORTS.	EXPORTS.
1901	1,686,664 kilograms	1,351,272 kilograms
1902	1,886,815 »	1,607,918 »
1903	2,005,892 »	1,465,561 »
1904	3,436,386 »	1,813,767 »
1905	3,014.348 »	2,613,062 »
1906	3,714,900 »	2,542,562 »
1907	3,693,547 »	1,869,303 »
1908	2,958;641 »	1,711,877 »
1909	2,886,828 »	1,792,941 »
1910	3,577,064 »	1,725,965 »
1911	4,663,000 »	3,196,000 »
1912	5,378,000 »	3,940,000 »
1913	8,039,000 »	5,610.000 »

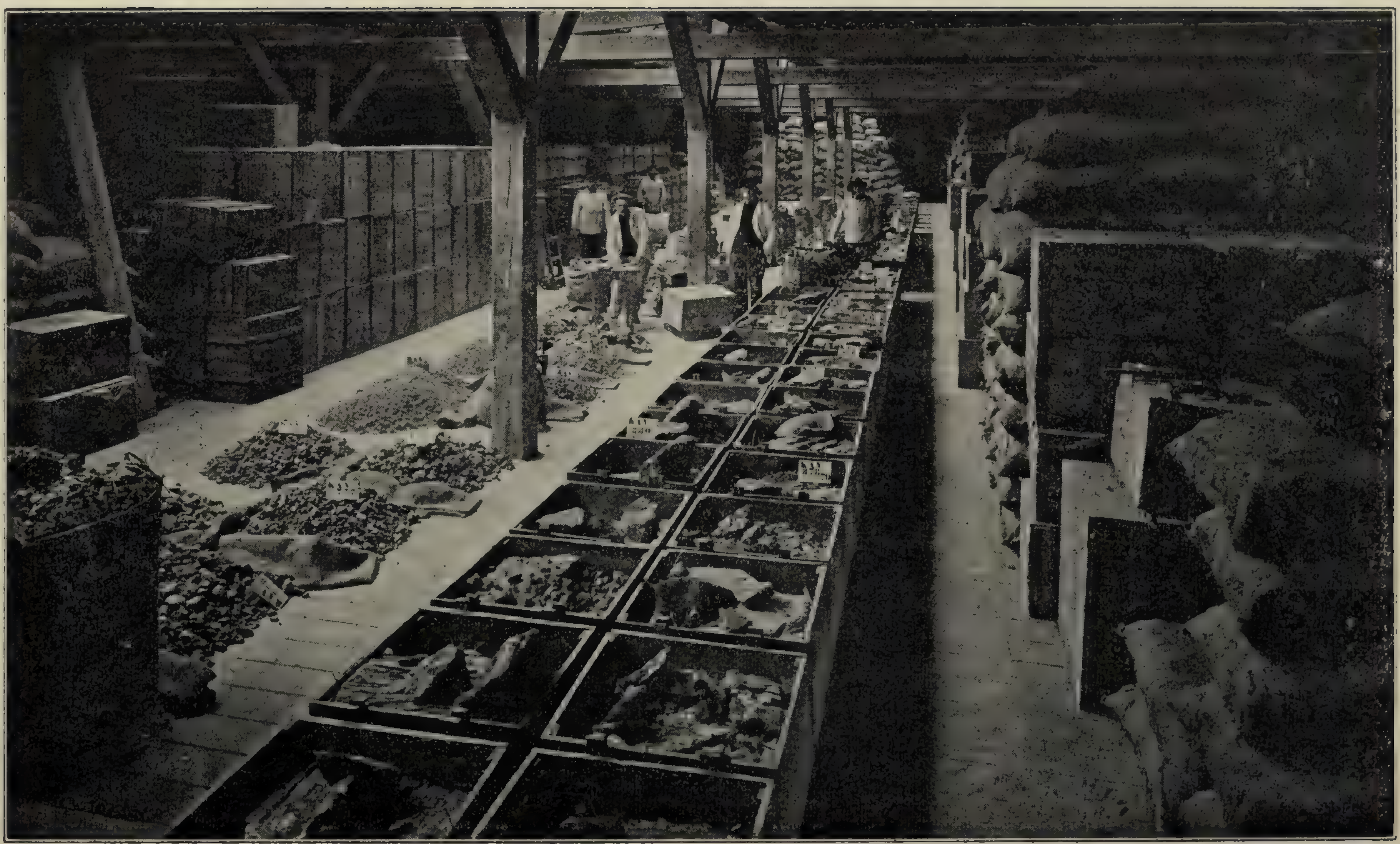
The statistics give the following totals of the imports and exports of raw gutta-percha (special trade):

YEAR.	IMPORTS.	EXPORTS.
1901	1,352,522 kilograms	836,752 kilograms
1902	885,421 »	1,073,946 »
1903	1,270,995 »	932,879 »
1904	896,727 »	792,859 »
1905	1,310,810 »	955,812 »
1906	2,500,379 »	2,160,751 »
1907	2,420,632 »	1,863,739 »
1908	1,314,168 »	1,431,810 »
1909	1,378,874 »	1,738,850 »
1910	3,012,766 »	3,651,039 »
1911	2,512,000 »	3,032,000 »
1912	2,889,000 »	2,953,000 »
1913	2,034,000 »	2,707,000 »

In the course of 1904, 200,000 kilograms of balata were imported in The Netherlands; in 1913 over 830,000 kilograms.



Gum Floor in the "Australië" Warehouse on the Handelskade at Amsterdam.
For the storing, treatment and sample exhibition of gum-copal, gum-damar, etc.



Gum Floor in, the "Amerika" Warehouse on the Handelskade at Amsterdam.
For the storing treatment and sample exhibition of gum-copal, gum-damar, etc.

GLUE.

The manufacture of glue is carried on in The Netherlands in two distinct forms. First, we have the bone-glue industry; secondly, the sarcocol industry. The output of these two manufactures is far from equal. The more important as regards quantity is the bone-glue industry, whereas sarcocol is obtained either as a by-product in a large bone-glue factory, or as the main product in a few smaller factories.

The most important bone-glue works are at Delft, Leiderdorp and Utrecht and in the province of North Brabant, where the tanneries put the raw materials at the disposal of the bone-glue works. They manufacture the glue used in the wood trade and for other technical purposes; bone dust (degelatinized or not) for agricultural purposes; bone oil for the manufacture of stearin and soap; and bone black, which is used in sugar-refineries, etc. The last two products are sold principally abroad. The bone dust exports exceed the imports by an average of 3,000,000 kilograms. This produce is principally exported to Germany, Great Britain and the United States.

COLOURS.

The cultivation of madder and woad on a large scale, which formerly flourished in The Netherlands, has disappeared. The natural indigo from Java and British India, which formerly abounded on the Netherlands market, has also nearly disappeared.

These natural dyes have been almost completely superceded by alizarin and artificial indigo, which are not manufactured in the country. The Netherlands take only a modest part in the manufacture of the large number of artificial colours, for which the principal constituents of coal-tar are used as the raw material. On the other hand, mineral colours are manufactured here in large quantities.

The firms which undertake the manufacture of colours make three kinds of products: *dry colours* (white lead, zinc white, minium, chromium yellow, lithopone, etc.); *lacquers* and *fine painters' colours;* and, lastly, *colours derived from* *coal-tar.* To this list may be also added the very important manufacture, in The Netherlands, of *varnish.*

Most of the factories make the paints *ready mixed.* There are over 90 factories in The Netherlands, employing about 1,300 hands, engaged in making colours. It would be difficult to classify them under distinct heads, as most of them supply widely differing products.

General view of a varnish and Japanlack factory at Rotterdam.

Colours in powder and chemical colours are sold both at home and abroad. White lead is sold all over the world, this product of Netherlands manufacture being in great demand for its excellent quality. According to the Netherlands Statistics, the imports and exports of white lead and zinc white (special trade) in The Netherlands, for the last few years, have been as follows:

IMPORTS AND EXPORTS OF WHITE LEAD AND ZINC WHITE AND GREY (SPECIAL TRADE)

(in kilograms)

YEAR.	WHITE LEAD		ZINC WHITE AND GREY	
	Imports	Exports	Imports	Exports
1906	10,363,186	9,242,502	9,051,622	10,480,049
1907	10,424,050	9,249,980	9,695,588	11,798,145
1908	10,118,115	85,43,287	8,961,449	10,632,445
1909	8,087,676	6,523,938	9,580,118	13,586,685
1910	8,038,518	6,265,953	11,242,065	11,469,581
1911	9,436,000	8,257,000	11,603,000	14.925,000
1912	8,238,000	7,205,000	6,964,000	15,889,000
1913	7,959,000	6,208,000	12,112 000	15 490,000

Owing to the campaign against the use of white lead, the consumption of *white lead in powder* is continually decreasing, whereas the use of *white lead crushed in oil* is increasing considerably.

The manufacture of lacquers and varnishes is carried out on a large scale and, in consequence of the ever-increasing demand, not without results. The greater part of this manufacture crosses the frontiers.

INK, LIQUID GLUE, SEALING-WAX.

The manufacture of ink in The Netherlands occupies only a small number of factories. However, most of these factories have for many years enjoyed an excellent reputation. Today, there are about 12 factories at work, of which 3 are at Apeldoorn, 2 at Amsterdam, 1 at St. Anna-Parochie, 1 at Amersfoort, 1 at Bennekom, 1 at Deventer, 1 at Kampen, 1 at Wageningen and 1 at Zevenaar.

Some only manufacture writing ink, copying ink, coloured inks, ink for pads, etc ; others make printing ink as well, while one factory only makes a speciality of ink powder for export overseas. The majority have added the manufacture of liquid glues and sealing wax.

The goods thus produced are exported, among other places, to the Netherlands Colonies, Belgium, the United States, British India and Turkey.

CHEMICAL FERTILIZERS.

The employment of chemical manures has in the last quarter of a century made great strides in The Netherlands, thanks to the scientific methods of agriculture. This has led not only to an important trade in these products, but also to the starting of a still more important industry.

View in a Fertilizer Manufactory.

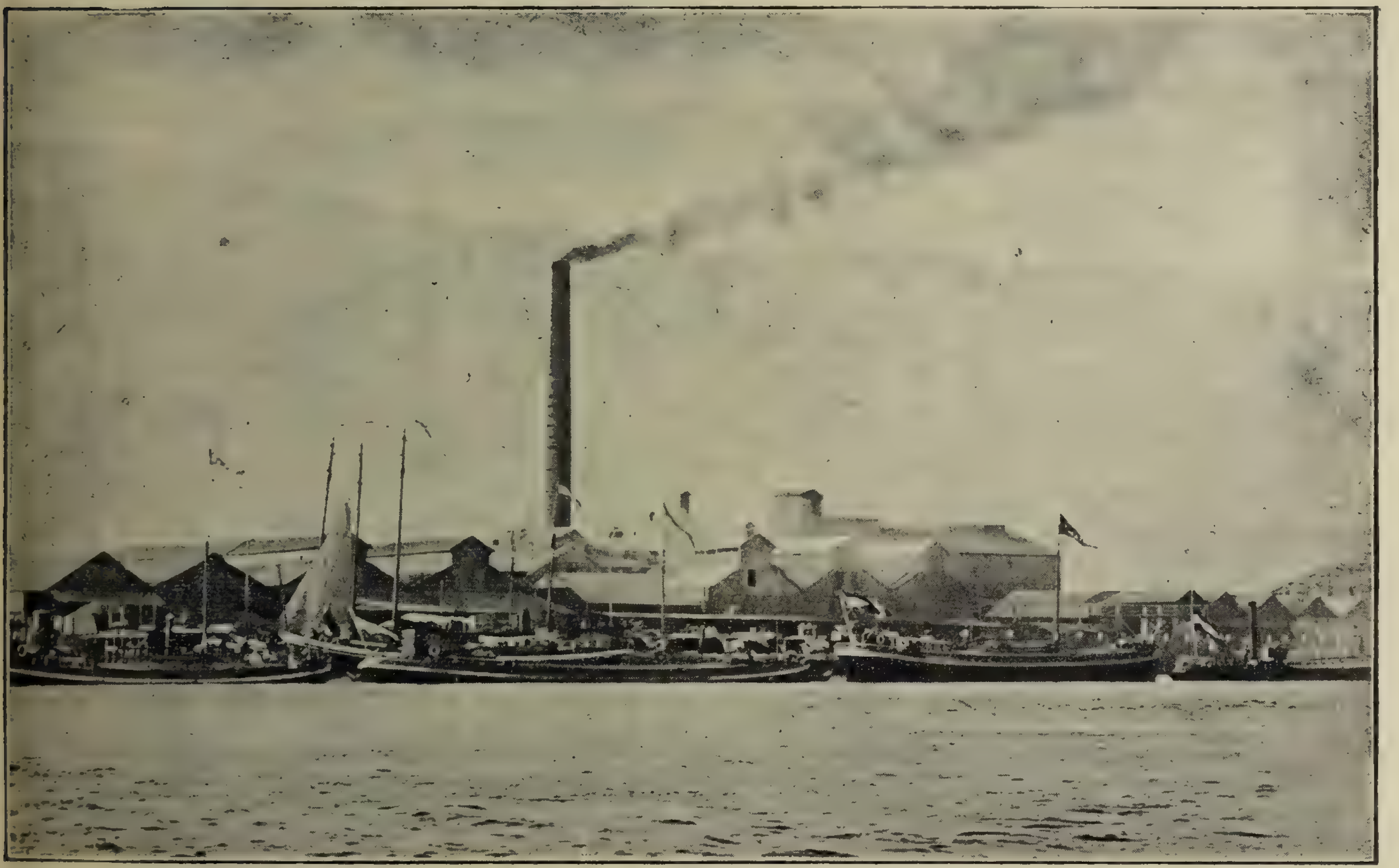
The various chemical manures used in The Netherlands are divided into two distinct groups. The first consists of those manufactured in The Netherlands from native or imported materials; the second of the very numerous kinds of manures imported from abroad. In the first group we find:

Superphosphates of lime;
Superphosphates of ammonia;
Liquid guano;
Sulphate of ammonia; and
Bone dust.

The second group consists of:

Thomas' basic phosphates (scoriae of dephosphorization);

Chili saltpetre (nitrate of soda);
Kainite, Carnallite and *Silvinite;*
Patent kali (sulphate of potassium and *magnesia);*
Chloride of potassium;
Lime and *marl;*
Nitrate of lime and } obtained by the artificial captation
Azotic lime } of the atmospheric nitrogen.



Guano and Superphosphate Manufactory at Zwyndrecht.

Guano and Superphosphate Manufactory at Zwyndrecht.

The chemical manures of the first group are manufactured in works specially established for that purpose, or else as by-products of other industries. The works engaged solely in the manufacture of these manures are at Amsterdam, Capelle-on-Yssel, Hoogkerk near Groningen, Pernis, Terneuzen, Uden (North Brabant) and Zwyndrecht, and employ about 1,000 hands.

These works use principally natural phosphates as raw material. In addition, they subject the different sorts of guano to treatment in order to render them more easily soluble.

A number of gas-works manufacture sulphate of ammonia. Moreover, this product is extracted, at Amsterdam, from the ammonia water of the night soil (by the *Liernur process*); at Weesp, in a chemical produce works, where they use the ammonia water from about 80 gas-works; and at Maastricht, in a coke-kiln establishment.

As we have already mentioned, bone dust is a by-product of the works where bone glue is manufactured.

For the preparation of superphosphates, large quantities of raw phosphates and pyrites are imported from overseas, which is the reason why the majority of the large chemical manure works have built their establishments on sites near the great waterways which are navigable for sea-going ships.

The annual production of superphosphates in the chemical manure works of The Netherlands is estimated at about 180 to 200 million kilograms.

A great part is exported to various European countries, to Netherlands India, the United States, Africa, Australia, etc.

PETROL AND PARAFFIN.

Petrol is imported in The Netherlands from North America ready refined, and from the Netherlands Indies in the raw state, by a petroleum company which owns a large warehouse and refinery at Rotterdam. Fifteen different products in the shape of petrol essence are obtained by distilling, each having a different boiling point and a different specific gravity according to the purpose for which it is intended.

Petrol reservoirs near Rotterdam.

It is estimated that a part of the output of this factory supplies the requirements of half the total consumption of the country, a consumption which is always increasing, especially since the spread of automobiles. Apart from the Netherlands market, these products are sold in every European country, principally in Germany, Great Britain and Belgium.

This same establishment also manufactures another important product: artificial turpentine.

There is only one company in The Netherlands engaged in the manufacture and refining of paraffin. This is a petroleum company which imports from the Netherlands Indies at Amsterdam a raw material obtained in the manufacture of paraffin after hydraulic pressure. From this it makes, in a factory situated opposite Amsterdam, solid paraffin and also gasoline. It also receives raw paraffin from the Indies and refines it. In 1913 it manufactured and refined 1,726,500 kilograms. This product is purchased principally by the candle factories; but it is also exported, especially to the Mediterranean countries.

GAS AND ITS BY-PRODUCTS.

The manufacture of gas, which was introduced into the large Netherlands towns soon after it was first employed in London and Paris, is now for the most part in the hands of the municipalities. A great number of towns and villages have gas-works. In the large towns, they are very extensive and equipped in the most up-to-date fashion. Although, consequently, the gas-works occupy a special position among Netherlands industries, the municipal gas factories are, nevertheless, worked with a commercial object, as, for instance, the sale of by-products, which are sold at the highest possible profit.

As might be expected, the gas industry enters more and more, especially in the large towns, into competition with electricity, both for lighting purposes and for motors. The electric supply works also are generally municipal property. Nevertheless, the consumption of gas has increased nearly everywhere, in consequence of the introduction of automatic meters, which have popularized the use of gas among the working classes, and also by reason of the more general employment of gas heating and cooking.

In The Netherlands, there are about 180 gas-works, employing about 7,000 hands; the great majority of these works make coal gas and carburetted water gas, which are often mixed before delivery. The price of gas in the important towns is from 5 to 7 cents (1d. to $1^2/_5$d.) per cubic meter. In the smaller towns, the price is from 5 to 9 cents (1d. to $1^4/_5$d.); and, in a few towns and villages of very small importance 10 cents (2d.) is charged per cubic meter. The gas-works supply as by-products coke, tar, sulphate of ammonia and ferrocyanide of potassium, or, as at The Hague, ferrocyanide of sodium.

The tar is mostly exported. Nevertheless, there are a certain number of factories in The Netherlands manufacturing products with a tar basis (tar distilleries) as, for instance, at Krimpen-on-Yssel and at Amsterdam. This industry produces, among other items, benzine, toluene, xylene, naphthaline, solvent naphtha, phenic acid or phenol, lysol, cresol, raw anthracene, raw creosote and pitch. The greater part of these products are sold abroad.

Sulphate of ammonia is exported in large quantities to the Netherlands Indies for the sugar plantations. It is also supplied to the chemical manure works.

According to semi-official returns, a certain number of gas works have produced the following quantities of sulphate of ammonia during the last few years:

In	1906	in	28	works	3,767	tons.
„	1907	„	31	„	4,014	„
„	1908	„	30	„	4,491	„
„	1909	„	33	„	4,598	„
„	1910	„	39	„	5,295	„
„	1911	„	40	„	5,560	„
„	1912	„	40	„	5,980	„
„	1912	„	42	„	6,250	„

We may further mention that the Arnhem and Haarlem gas-works produce large quantities of liquid ammonia (about 250 tons each yearly), which is principally exported to Belgium and Germany.

GUNPOWDER AND FIREWORKS.

Gunpowder and fireworks are made on only a very small scale in The Netherlands. The manufacture of gunpowder is in the hands of a single company, which works mainly for the Netherlands Government.

This company has a powder factory at Muiden and a guncotton and nitro-glycerine factory at Nieuwer-Amstel (both near Amsterdam).

There are only a few firework factories in The Netherlands, among other places, at Leeuwarden, Leyden and Utrecht. The Netherlands fireworks are sold abroad, amongst other countries in the United States of America and Canada.

QUININE.

Among the most important products which the Colonies send to the mother country is cinchona bark, which figures on the Amsterdam market and comes mainly from the island of Java, where the cinchona tree is cultivated both by private individuals and by the Government.

In 1913 105,884 packages or about 9,212,000 kilograms were imported at Amsterdam, of which 8,212,000 kilograms came from private plantations and 1,000,000 kilograms from the Government plantations in Java.

The exports from Java were in :

1901	6,399,500	kilograms.
1902	6,673,000	„
1903	6,862,500	„
1904	7,225,000	„
1905	7,699,500	„
1906	6,758,000	„
1907	8,606,000	„
1908	7,838,500	„

1909	7,745,000	kilograms
1910	9,021,500	„
1911	8,308,000	„
1912	8,095,000	„
1913	9,355,950	„

The following statement gives an idea of the development of the Amsterdam cinchona market during the last few years:

YEAR:	Offered for public sale (kilograms)		Sold by auction and by private treaty (kilograms).	
	Cinchona Bark	Sulphate of Quinine	Cinchona Bark	Sulphate of Quinine
1893	—	—	3,369,506	149,540
1894	3,779,000	—	3,316,339	157,820
1895	4,160,000	209,500	4,484,438	225,188
1896	4,859,000	260,900	4,977,182	263,421
1897	4,887,000	268,600	4,849,739	264,000
1898	4,996,000	245,300	5,249,862	259,793
1899	5,505,000	270,500	5,562,384	272,570
1900	5,000,000	239,500	5,237,732	249,680
1901	6,642,000	327,500	6,598,864	324,279
1902	6,480,500	320,500	6,502,452	320,464
1903	6,710,500	324,900	6,838,187	330,817
1904	7,617,000	368,900	7,661,827	370,178
1905	8,035,000	407,800	6,100,298	309,217
1906	8,794,480	477,217	8,542,817	465,424
1907	8,532,310	482,168	8,970,019	488,154
1908	8,226,742	485,004	7,580,172	447,200
1909	8,331,742	496,422	8,134,098	484,958
1910	8,841,753	532,230	8,573,912	516,639
1911	9,139,662	569,954	8,325,365	518,624
1912	10,078,950	608,051	6,635,401	398,535
1913	12,600,218	741,066	7,671,050	449,673

Part of the cinchona sold at Amsterdam is used in the two Netherlands factories (one at Amsterdam and the other at Maarssen) engaged in the manufacture of sulphate of

Interior of the Cinchona Establishments at Amsterdam.

quinine. Considerable quantitities are also exported to the sulphate of quinine factories abroad.

SODA.

The manufacture of soda, properly so-called, ceased in The Netherlands more than 30 years ago, when the manufacture of soda crystals by the Leblanc process had to be abandoned here owing to the introduction of the Solvay process.

The country now contains only manufactories of crystallized soda, which confine themselves to dissolving the anhydrous soda and leaving it to crystallize. These factories suffer from the importation, especially from Belgium, not only of soda but also of a mixture of soda salts and Glauber salt crystals, a mixture which, owing to the very low price of the latter, can be sold much more cheaply.

Basins for crystalising soda

Where the soda is stored.

The Netherlands manufacturers, established particularly at Rotterdam (2), Amsterdam, Haarlem, Wormerveer and Schiedam, have mutually pledged themselves to supply only pure soda salts, without any mixture.

TEXTILE DYEING WORKS AND CHEMICAL CLEANING WORKS.

The dyeing works that do not belong to a textile establishment may be included among chemical industries because they are concerned with the dyeing and re-dyeing of made and worn garments and with chemical cleaning.

These establishments exist in every part of the country. Most of them are carried on on modest lines, but generally they have plenty of work. In all there are some 60 of them (employing about 1,400 hands), including some of greater importance, the equipment of which has attained a high degree of perfection from the technical point of view. Establishments of this kind exist at Almelo, Sloten, Amsterdam, Rotterdam, Tilburg, Schiedam and Nymwegen, employing together over 800 hands. There are some likewise at Apeldoorn, Dordrecht, Haarlem, The Hague and Leyden.

GLYCERINE.

Glycerine is a by-product of the large soap works as well as of the candle factories in The Netherlands. A chemical works which specializes in the refining of the raw glycerine produced by the soap works is established at Naarden. It exports its produce, intended for the manufacture of nitroglycerine for the mining industry, principally abroad and notably to South Africa and Great Britain.

CANDLES AND STEARINE.

The manufacture of stearine candles, which began in The Netherlands in the middle of the nineteenth century, is represented by only two factories, one at Gouda, with 600 hands, and one at Schiedam, with 580 hands, both of which work on a large scale and mostly for export.

Interior of a dye and chemical cleaning works at Almelo.

They are fitted up with all the most modern appliances for the saponification of fats, the separating of the sebaceous acids, the purifying of the acids and the moulding of the candles. In 1881, the Gouda factory also started a box-making establishment and, in 1898, a glycerine factory. In 1902, it added a soap works.

The rapid development of these two factories has resulted in a large increase in the importation of palm-oil, talc and other materials for the manufacture of stearine.

From 1847 to 1856, the excess of imports of stearine over the exports averaged 26,000 kilograms. From 1897 to 1906, the excess of exports over imports amounted to over 5,510,000 kilograms on the average; in 1913 this excess amounted to 5,618,000 kilograms.

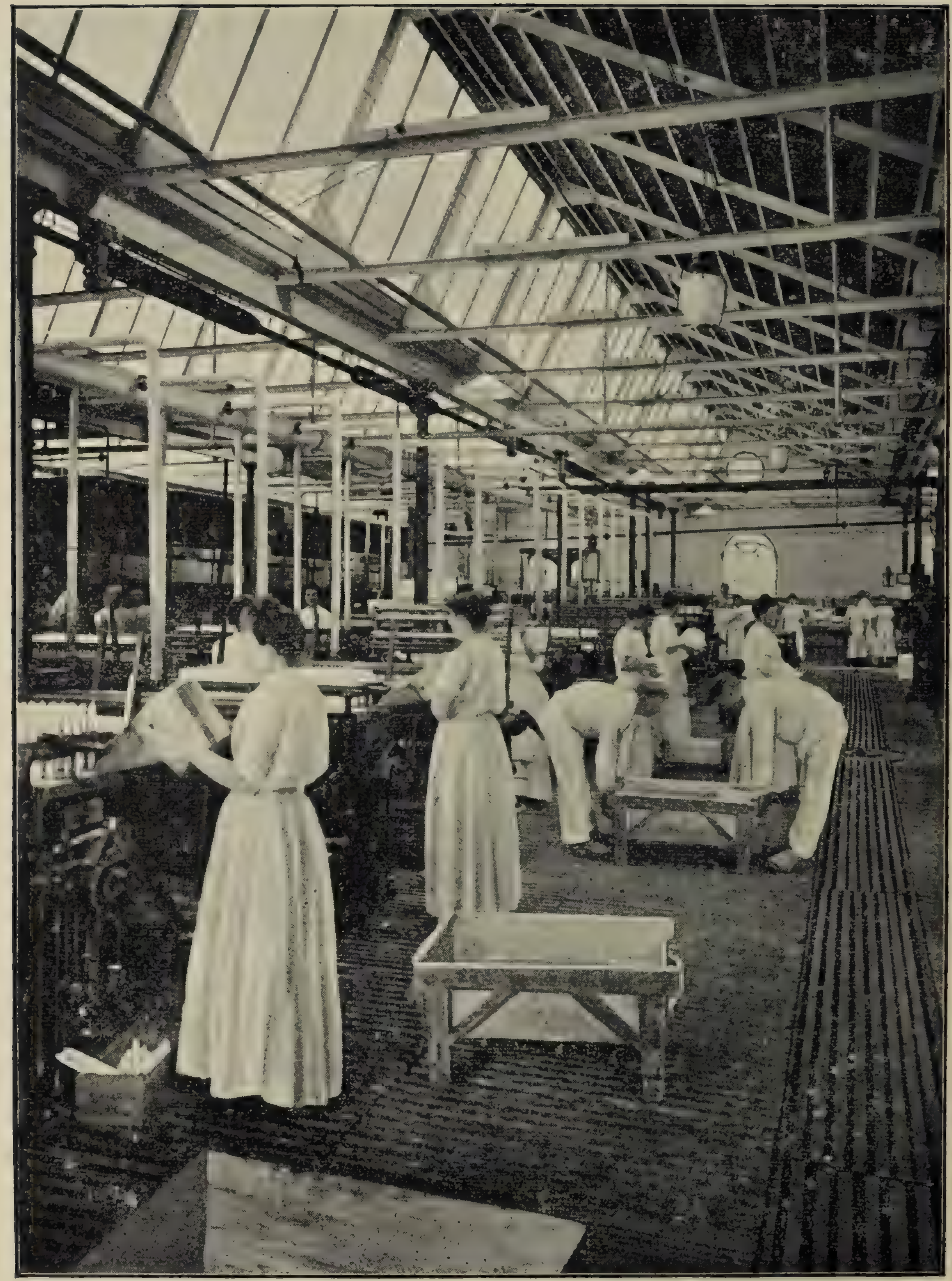
The stearine manufactured by these two factories is sent out partly in the form of candles and partly in cakes and blocks. The latter form is chosen for those countries whose position precludes the carrying on of this industry or which levy too heavy duties on candles.

In 1913 9,284,000 kilograms of stearine were exported, principally to Great Britain, Germany, Venezuela, Columbia and Italy. Oleic acid (oleine), the residue of the manufacture of stearine, is used in the textile trade (especially in the dressing of wool) and also in the soap factories.

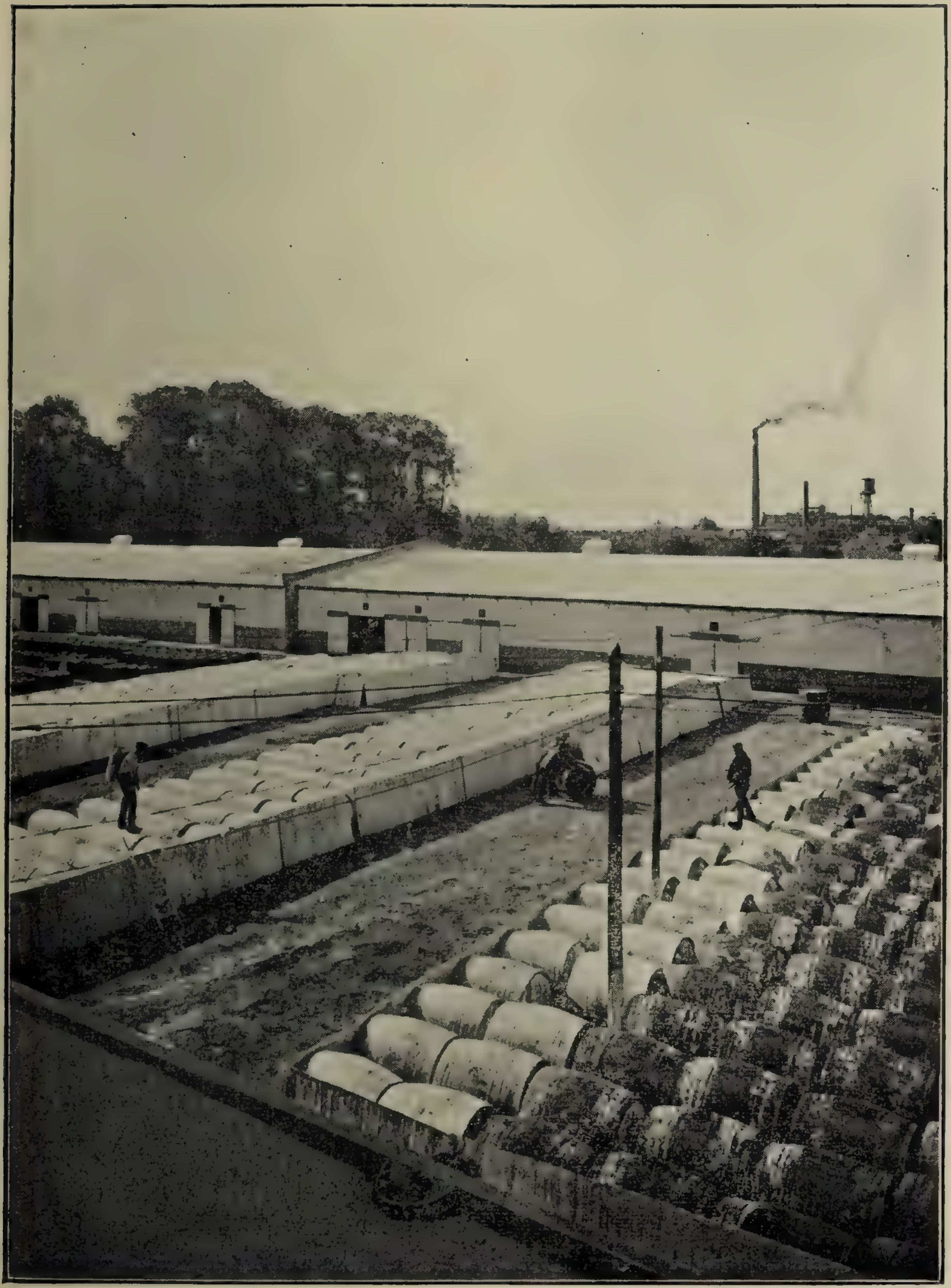
Another by-product is stearine pitch, a hard substance which is used as a substitute for gutta percha in the insulation of electric conduits. It is largely exported to the United States.

New markets have continuously to be sought for the trade in candles, the sale of which in The Netherlands is extremely limited, while the exports to several European countries and America has greatly diminished owing to the heavy customs duties.

During the last few years, the Netherlands candle factories have occupied themselves with the manufacture of candles composed of a mixture of stearine and paraffin, to compete with the paraffin candles which are manufactured at a lower price by the petroleum companies in British India and Burmah from their own materials and which have partly



Interior of a Candle Manufactory at Gouda.



Where the raw materials of a Candle Manufactory at Gouda are stored.

supplanted stearine candles, especially in British India and China.

The Gouda factory manufactures also another article, namely, a sort of small candles for tea-warmers and night-lights, which burn for a limited number of hours. These articles are also manufactured on a large scale in a special works at Zaandam (with 50 hands). They find a market all over the world.

Exports of candles in 1913 amounted to 3,625,000 kilograms, mostly from the port of Rotterdam.

Stearine candles have almost entirely supplanted the old church candles and tapers made of tallow. The candles are, however, still used in Catholic churches; and they are therefore still exported to South America and Portugal.

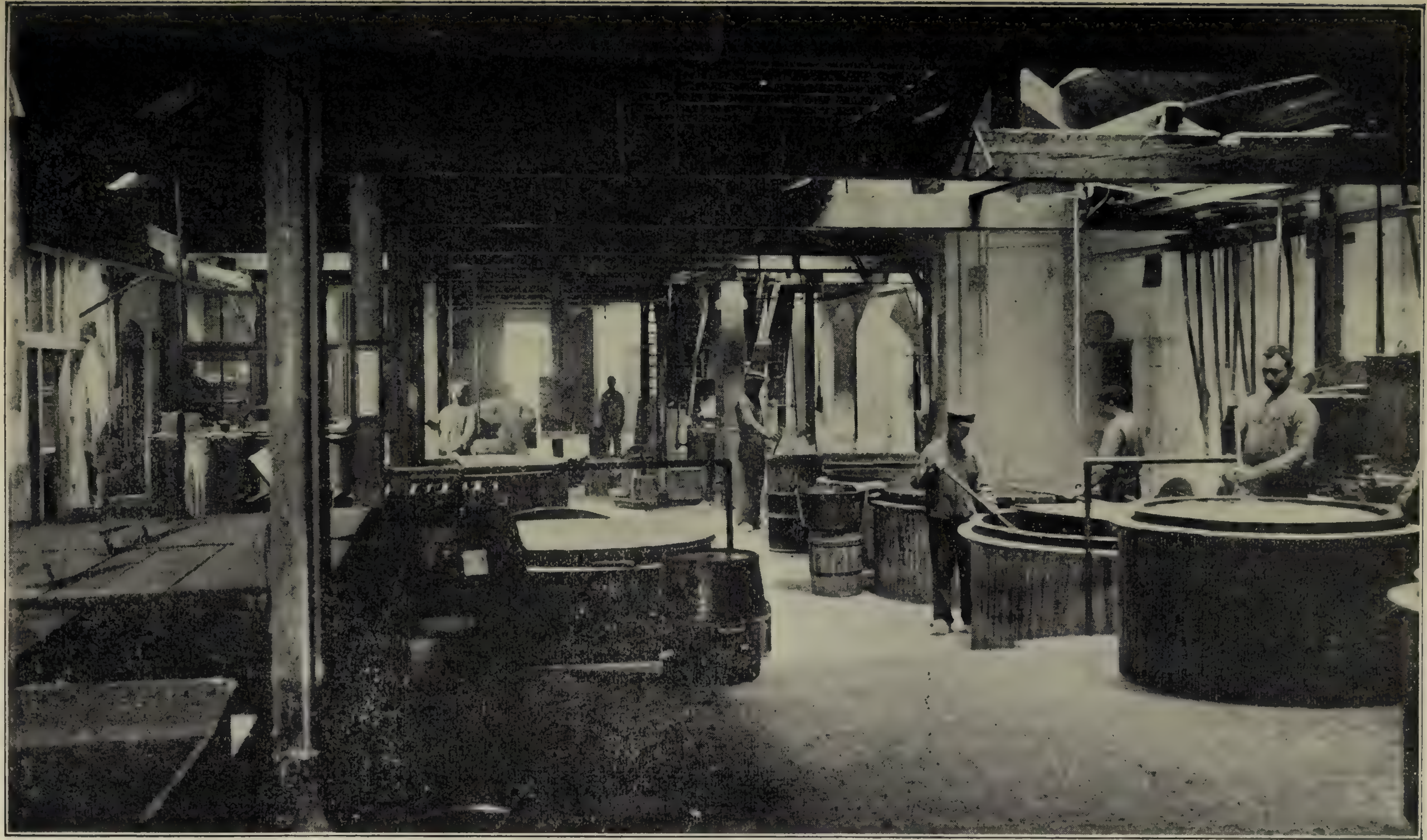
For this reason there remain, in the provinces of Gelderland, Brabant and Limburg, a few church candle and wax-bleaching factories.

SOAP.

As is well known, soaps are divided into two classes, according to the kind of alkali used in their making: soft soap with a *potash* basis (green and yellow soap) and hard soap with a *soda* basis.

Formerly, the manufacture of soft soap in The Netherlands was, owing to the heavy excise duties, confined to a small number of factories, while the number of hard soap works was even smaller, but was slowly increasing. In 1875, there were 60 soft soap works and 17 hard soap works; in 1885, 63 and 19; in 1890, 64 and 27. In 1893, the excise duty on this article of daily use was abolished. The increase in the sale of soap that ensued had the immediate result of the starting of a large number of soap-works. Ere long, there were 72. These overstocked the market and caused a lowering of prices; and a reaction was bound to follow.

Many large and small factories disappeared even more quickly than they had arisen. To-day, there are still about 45, scattered throughout the country and employing 850 workmen. Amongst the more important may be mentioned



Distillery of a factory for toilet and other soaps at Nymwegen.

General view of a building and yards of a soap factory at Nymwegen.

those at Eindhoven, Leyden, Nymwegen, Rotterdam and Wormerveer.

Nowadays, the large soap-works (about ten) apply to fats the same process as is used in the stearine factories and decompose them, preliminary to the saponification, into fat acids and glycerine.

In addition to soft soap, which is sold in the country itself and in the Netherlands Indies, hard soap and special sorts of soap, such as coconut soap (an article in great demand), toilet soap (coloured and scented), transparent soap (produced by a combination of alcohol and glycerine), shaving soap, bath soap and soap used in the textile trade for the dressing of raw cotton are manufactured. These articles, together with soap powder, introduced during the last few years as an article of commerce, have, in addition to The Netherlands and its colonies, found a market in foreign countries, notably in China, Japan, British India, Morocco, Turkey, Egypt and South America.

THE STARCHY PRODUCTS TRADE.

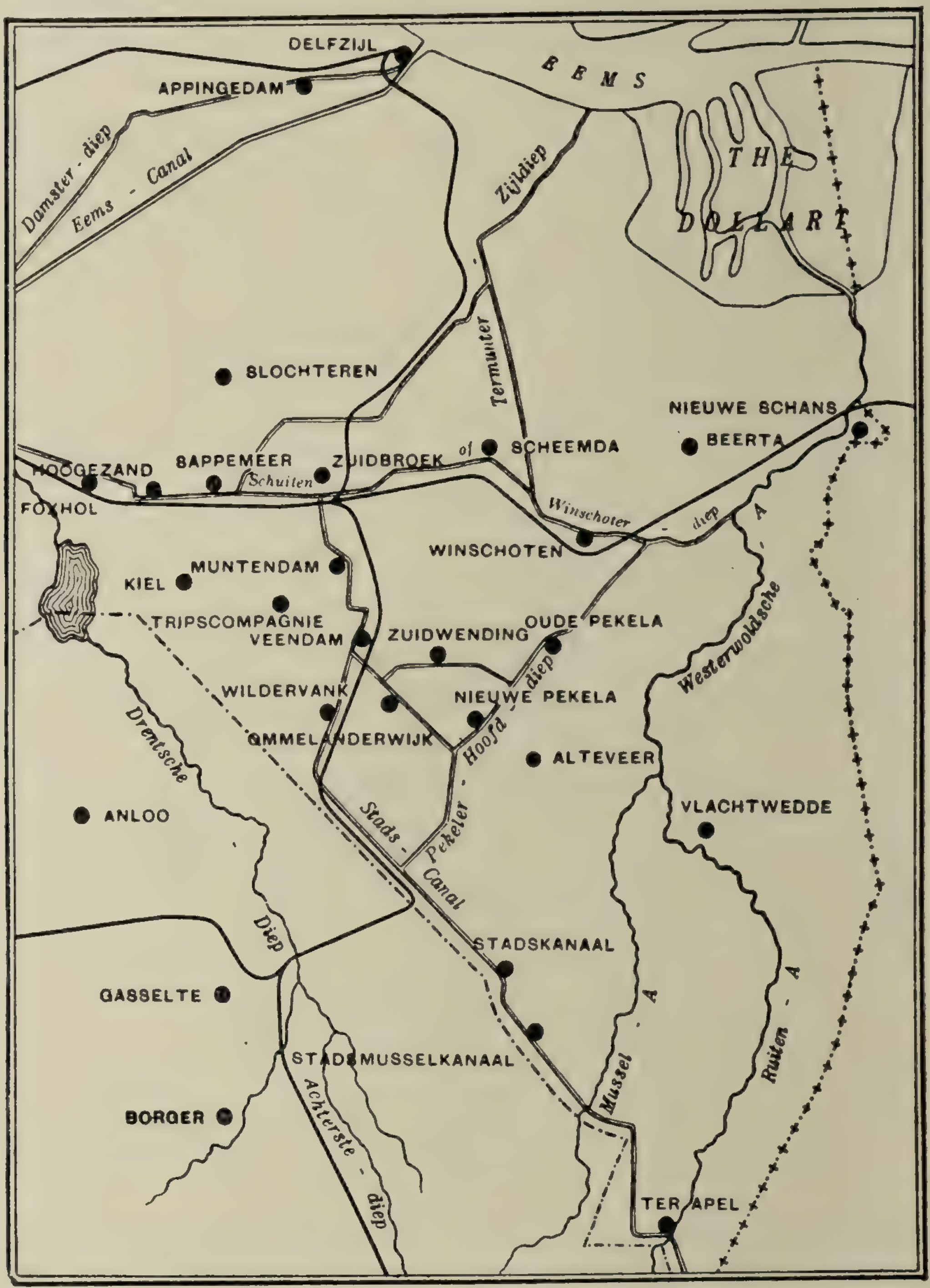
The fecula of several vegetables (indigenous and others), such as potato, wheat, rice and maize, is an article of the first importance to different branches of Netherlands industry.

It was in the form of starch factories that this trade made its first start in the country. The industry has been in existence for over 200 years.

In 1819, there were 31 of these factories to be found in The Netherlands, of which 15 were in North Holland (in the Zaanland).

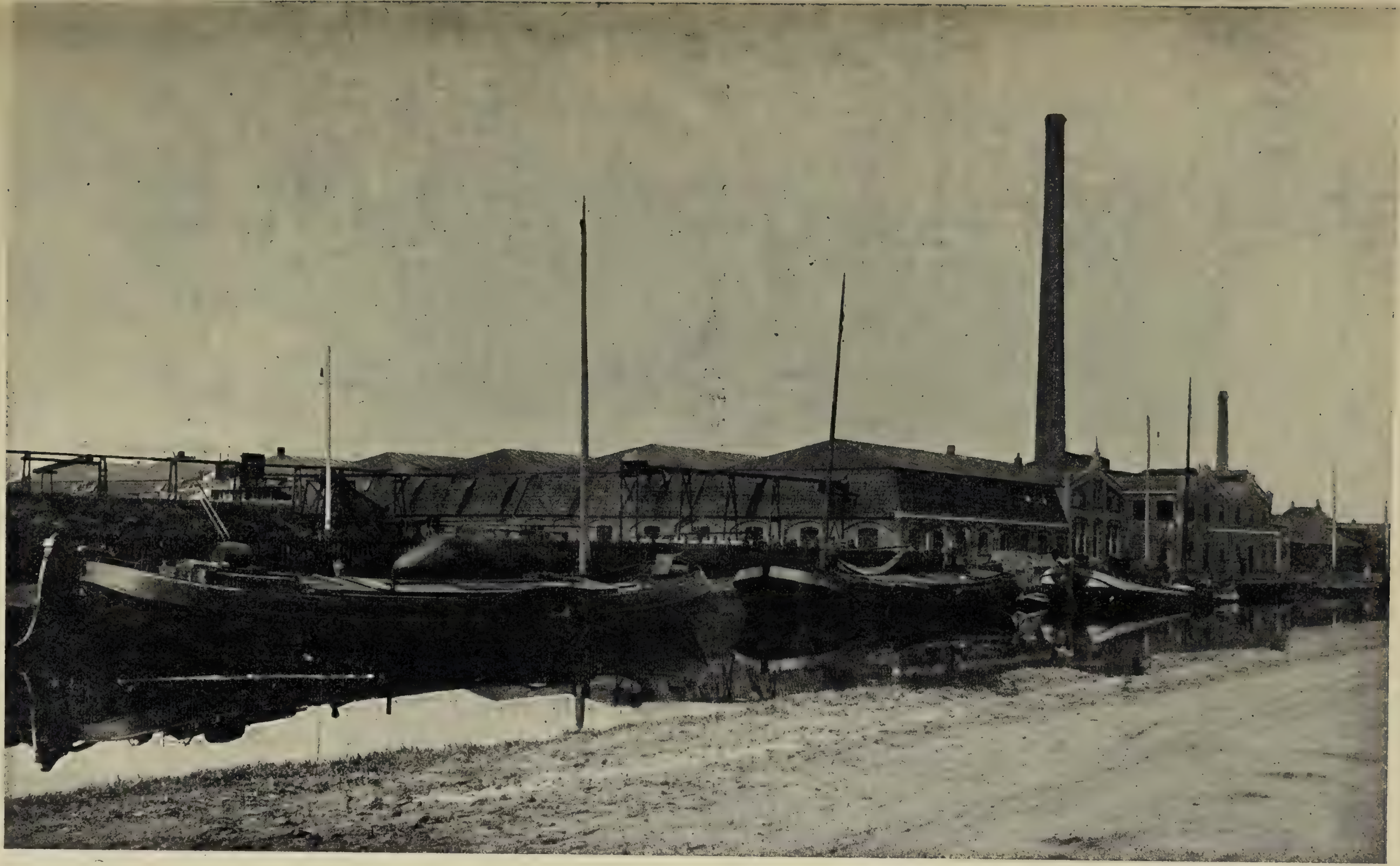
Rice and wheat, which formerly served as raw material for this manufacture, have been since supplanted, for the most part, by maize, which is much cheaper. The consumption of rice starch in The Netherlands is insignificant, and the manufacturers of that product make it mainly for export.

The output of maize starch has increased considerably in The Netherlands during the last ten years. This produce is manufactured in three factories, which dispose of their produce, or at any rate of a great deal of it, in the country itself. Nevertheless, they also manufacture for export, principally to Great Britain. It is manufactured in powder and in lumps. In powder, it is used mostly in the textile trade.



The centre of the potato starch industry
(The Groningen Peat Districts).

Wheat starch, which is manufactured in The Netherlands, but the production of which becomes more and more limited under the pressure of the great competition of maize starch, is sold, amongst other countries, to Great Britain. After the fecula has been taken from the wheat flour, the



View of a potato-starch factory at Foxhol (Groningen).

gluten residues are extracted and employed to make a special and very nutritive bread, used chiefly by diabetic patients. The gluten of maize is compressed and sold in the form of oil-cake for cattle food.

At present, there are 11 starch factories in The Netherlands, employing about 420 hands; 8 of these factories are located in the Zaanland.

This industry made tremendous strides when the manufacture of potato fecula was started. The first potato fecula factory in The Netherlands was opened at Muntendam, in 1840, and did not long remain the only one. In fact, the growing demand for this article induced a rapid increase in the production and in the number of factories. The peatlands of Groningen and Drenthe (and later those of Overyssel), which, after the removal of the peat, are easily prepared for growing potatoes, became, in a short time, regular manufacturing districts.

Of the industries connected with potato fecula, the industry engaged in the manufacture of that fecula is only a subdivision, although by far the most important. Side by side with the manufacture of dry potato starch, there are the manufactures of dextrin and glucose.

In The Netherlands there are 31 factories, large and small, that manufacture only dry potato fecula, to the exclusion of all other products; in addition there are two where moist potato fecula is made, this being a semi-product used in the manufacture of dry fecula and of glucose.

There are in The Netherlands 6 factories (of which 3 are included in the aforesaid 31) where part of the potato fecula is not dried for trade purposes, but transformed into dextrin, which is obtained by heating the fecula after adding nitrate of potash. There are also 5 factories (4 of which are mentioned under the dry fecula factories) where the moist fecula which has been obtained is used in the manufacture of glucose (commonly termed potato syrup) by subjecting it to the action of acids.

Twenty-six of these factories are in the province of Groningen, of which eleven are co-operative societies; the others themselves buy the potatoes which they use.

There are, in addition, some manufactories of dextrin and glucose where these products are made with dry fecula or other starches (maize, sago, tapioca, etc.). In all, the fecula trade employs more than 2,300 workmen.

The total consumption of potatoes in all the factories that do their own grinding for the manufacture of fecula amounts, in years when the crop is satisfactory, to about 12 million hectoliters of potatoes, weighing about 61 kilograms to the hectoliter. At the normal price, this represents a value of £ 750,000 to £ 800,000.

The majority of the (dry) potato fecula and of the dextrin is exported to those countries which possess large textile industries, whenever the importation of these products is not hampered by excessive customs duties. Glucose, on the other hand, is sold almost exclusively in The Netherlands itself. The following figures show the importance of potato fecula as an export article in the last fifty years:

IMPORTS AND EXPORTS OF POTATO STARCH (SPECIAL TRADE) FROM 1847 TO 1913

(in 1,000 kilograms)

	Years	Imports	Exports	Excess of Exports
On the average	1847—56	107	123	16
	1857—66	1,328	1,647	319
	1867—76	2,110	6,827	4,717
	1877—86	2,003	14,623	12,620
	1887—96	8,775	34,561	25,786
	1897—1906	19,684	65,552	45,868
	1906	26,876	90,569	63,693
	1907	23,449	97,510	74,061
	1908	23,015	86,301	63,286
	1909	25,109	89,236	64,127
	1910	28,735	82,863	54,128
	1911	27,284	87,923	60,639
	1912	25,454	97,011	71,557
	1913	26,794	105,855	79,061

As in the case of potato starch, the output of dextrin in The Netherlands is larger than that required for home consumption. The manufacturers therefore dispose of their surplus produce abroad; the principal buyers are Great Britain (Lancashire), Belgium, Canada, Spain, Norway and Japan.

Thanks to the progress of technical and chemical science, the glucose industry, which started in a humble way in The Netherlands about thirty years ago, developed rapidly and became, in a very short time, what it is to-day, that is, an exceedingly important industry supporting a large number of workers.

Twelve factories in all produce glucose in a solid form (grape sugar) or glucose in a liquid form (syrup). The last-named is the more important of the two manufactures

The syrup and the grape sugar are used in the manufacture of confectionery and pastry, in the manufacture of sweets, sugar plums and bonbons and in the manufacture of jam, jellies, etc.; and grape sugar is also used in the breweries, where it partly takes the place of malt. Moreover, glucose is used considerably in the textile industry and in the rice mills.

As a rule, the quality of Netherlands glucose is superior to any other. Nevertheless, nearly the whole of the output is used in the country, the export trade being greatly handicapped by the heavy duties imposed by adjoining countries. It is exported only to Great Britain, in limited quantities.

OTHER CHEMICAL INDUSTRIES.

We have far from exhausted the subject in hand, namely, the present importance of the chemical trade in The Netherlands

Not only does its scope extend daily, but the necessarily limited compass of this general sketch does not permit us to mention each branch specially and to enumerate its peculiarities. We will therefore confine ourselves to making a selection among those branches which are represented by one or more absolutely first-class establishments.

Volatile oils, *synthetic perfumes*, *natural* and *synthetic fruit essences* are still imported in large quantities, but are nevertheless manufactured on an increasing scale in The Netherlands, among other places, at Amsterdam (3), Groningen, Haarlem, The Hague, Naarden, Nieuwendam, Ouder-Amstel, Roermond and Zaandam. These factories find a large market for their wares in other countries, without counting the interior and the Netherlands Colonies.

The *perfumery factories*, whose speciality is principally *eau de Cologne*, are at Amersfoort, Amsterdam, Arnhem, Bergen-op-Zoom, Delft, The Hague, Haarlem, Leyden and Roermond. These do not work so much for export. They find a good market for their wares in the country itself and in the Netherlands Colonies. An *artificial musk* factory is established at Melik-Herkenbosch, in Limburg.

Acetic acid is manufactured at Schiedam and Tiel from imported acetate of lime. Part of the output of acetic acid of the two factories is exported. Besides this, the Schiedam factory manufactures acetate of lead, the greater part of which is likewise exported.

Magnesia and *magnesite*. Rough magnesium spar from Greece (Euboea) is imported in fairly large quantities and manufactured into both *magnesia alba* and *magnesia usta* (among others, at the Amsterdam and Kampen factories). Of the output of these products, 40 °/₀ goes to Germany, a like quantity to Great Britain and the remainder is exported to other countries.

Rough magnesium spar is likewise used (among other places, at Amsterdam, Vlaardingen, Zaandam and Zoeterwoude, near Leyden) for the extraction of carbonic acid. The residue is sold in the country to the manufacturers of fire-proof slabs for partitions and to the manufacturers of artifical grind-stones; or else it is exported, principally to Germany, France, Great Britain and the United States.

The principal artificial products manufactured in The Netherlands, besides those already mentioned, are: *chloroform* (at Maarssen and Roermond), *cocaine* (at Naarden and Ouder-Amstel, near Amsterdam), *ether* (at Maarssen and Uitgeest), *chloride of etyl* (at The Hague), articles for the *preservation of leather* (at Amersfoort, Osch and Utrecht), *sugar of milk* (at Uitgeest), *pharmaceutical products* (at Almelo, Amersfoort, Amsterdam, Dordrecht, Groningen, The Hague, Maarssen, Meppel, Schiedam, Sneek, Tiel, Utrecht and Zeist), *medicines in a compressed form* (among other places, at Amsterdam, The Hague, Meppel and Schiedam), *artificial mineral waters* and *salts* for their manufacture at home (at Amsterdam and The Hague), *antiseptic products for dressings* (at Amsterdam, Arnhem and Emst, near Vaassen), *tooth powders* and *tooth washes* (among other places, at Amsterdam, Arnhem, The Hague and Nymwegen), *nitric acid* (at Nieuwer-Amstel), *compressed hydrogen and oxygen* (at Amsterdam and Schiedam), *chloride of zinc* in powder and dissolved (at Amsterdam), *green and blue copperas* (at Amsterdam), *rennet*, *colouring matter for cheese and butter* (at Beetsterzwaag, Gouda, Rotterdam, Uitgeest, Venlo, Waddinxveen and Wormerveer), *incandescent mantles* (at Amersfoort, Amsterdam, Enschede, Rotterdam, Venlo, Zalt-Bommel and Zwolle), *nitrate of thorium* (at Katwyk-on-Sea), and *liquid carbonic acid* (at Amsterdam and Rotterdam). Many of these articles are also manufactured for export.

The use of pharmaceutical products, including those in a compressed form, manufactured in The Netherlands, is extending more and more. These products, including the "specialities", are even sold abroad, notably in British India, Japan and South Africa.

OILS AND OIL-CAKES.

The manufacture of oil and oil-cakes from native and foreign oleaginous grains is one of the oldest Netherlands industries. The first works to manufacture oil and oil-cakes in this way were called "olieslagerijen" (oil mills). The oil was obtained by crushing the oleaginous grains by means of pestles. In the seventeenth century, revolving grindstones, placed perpendicularly, were introduced into the oil mills.

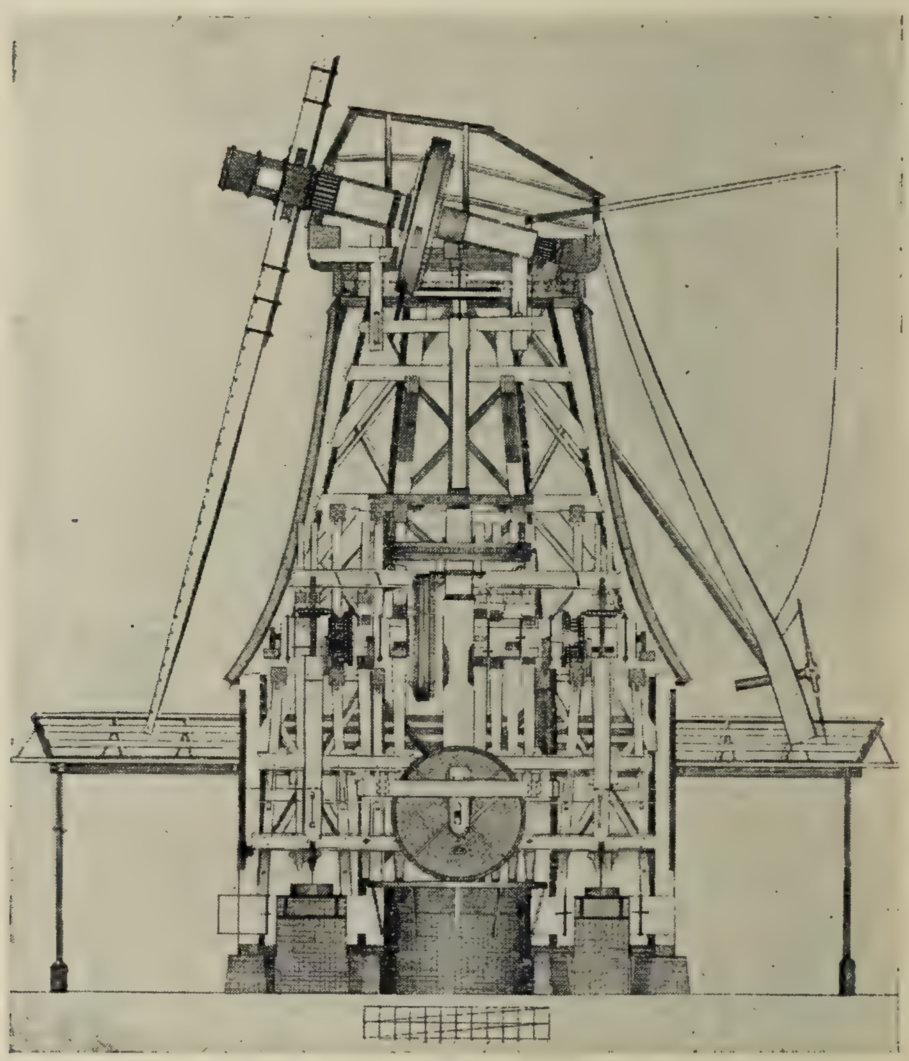
At the beginning of the eighteenth century, the oil mills were found mostly in the Zaanland. In 1750. there were over 100 of these mills; but the number has since decreased, so that, in 1840, there were only 50 mills east and 10 west of Zaandam.

Meantime, in the course of years, the oil industry had spread throughout the country. In 1819, about 420 oil mills existed in The Netherlands; in 1873, there were 484, the majority of which were small ones, local in character, where the peasants, who usually grew small quantities of colza or flax, had the oil pressed for their own use and the linseed or rapeseed cakes manufactured for feeding their cattle. But this state of things belongs mainly to the past; for, though

An old oil mill on the Zaan.

a large number of oil mills are still in existence throughout the country, the oil industry has more and more become centred in the great steam mills, which produce not only for domestic consumption but also for the world's trade. In our own day, the Zaanland is still the principal centre of the oil trade, but the number of mills has greatly diminished.

From 56 in 1897, it has fallen to 30 today, but a single one of these oil mills produces thirty times as much as the old wind mills. There are now in The Netherlands about 220 oil mills, large and small, employing about 3,250 hands.



Cross-cut of an old oil mill.

In the big steam mills, they use hydraulic presses. The Netherlands oil trade is concerned especially with the manufacture of oil and oil-cakes from linseed, colza, groundnuts, sesame and soya beans. The extraction of oil from the last three is confined to a few of the mills, while other factories are concerned especially with the refining of olive and palm-oil.

Ground-nuts, sesame and soya beans are all imported produce. The ground-nuts come principally from East and West Africa (Senegambia), America and the island of Java; the sesame mostly from Java, Africa and the Indies; and the soya beans from Manchuria. Linseed and colza, on the contrary, are also native products.

A modern oil mill on the Zaan.

For linseed, the Netherlands mills use both the fully ripened seed imported from other countries (such as the United States, the Argentine and British India) and the half-ripe seeds of the native flax, which is principally grown for fibre.

This country was formerly the centre of colza growing. This product is still cultivated on a fairly large scale today, especially in the brackish clay lands. Nevertheless, here as everywhere else it decreased largely during the latter half of the nineteenth century, partly because rape-oil is hardly ever used for lighting purposes since the introduction of petroleum, gas and electricity, and partly on account of the importation of other oleaginous substances for the manufacture of oil, as well as of other kinds of oil coming from the tropics.

For a very long time, The Netherlands have done an important trade in oleaginous grains and fruits, including not only those cultivated in the country itself, but also those grown in other countries.

The figures at hand show clearly the extent and importance of this trade. The Netherlands Statistics of Import, Export and Transit give the following figures (in thousands of kilograms) concerning the exports and imports (special trade) of *colza* during the last seven years:

	1907	1908	1909	1910	1911	1912	1913
Imports	22,674	22,125	32,454	69,430	48,347	43,049	46,575
Exports	9,507	10,793	7,793	21,414	16,373	13,528	18,296
Excess of imports over exports....	13,167	11,332	24,661	48,016	31,974	29,521	28,279

The figures for the imports and exports (special trade) of *linseed* in the corresponding years are as follows (in thousands of kilograms):

	1907	1908	1909	1910	1911	1912	1913
Imports	252,301	294,092	247,267	191,484	171,161	208,929	285,952
Exports	87,295	110,037	77,251	47,804	42,920	60,275	86,350
Excess of imports over exports........	165,006	184,055	170,016	143.680	128,241	148,654	199,602

The following figures give an idea of the increase of imports (special trade) of *ground-nuts* since 1901:

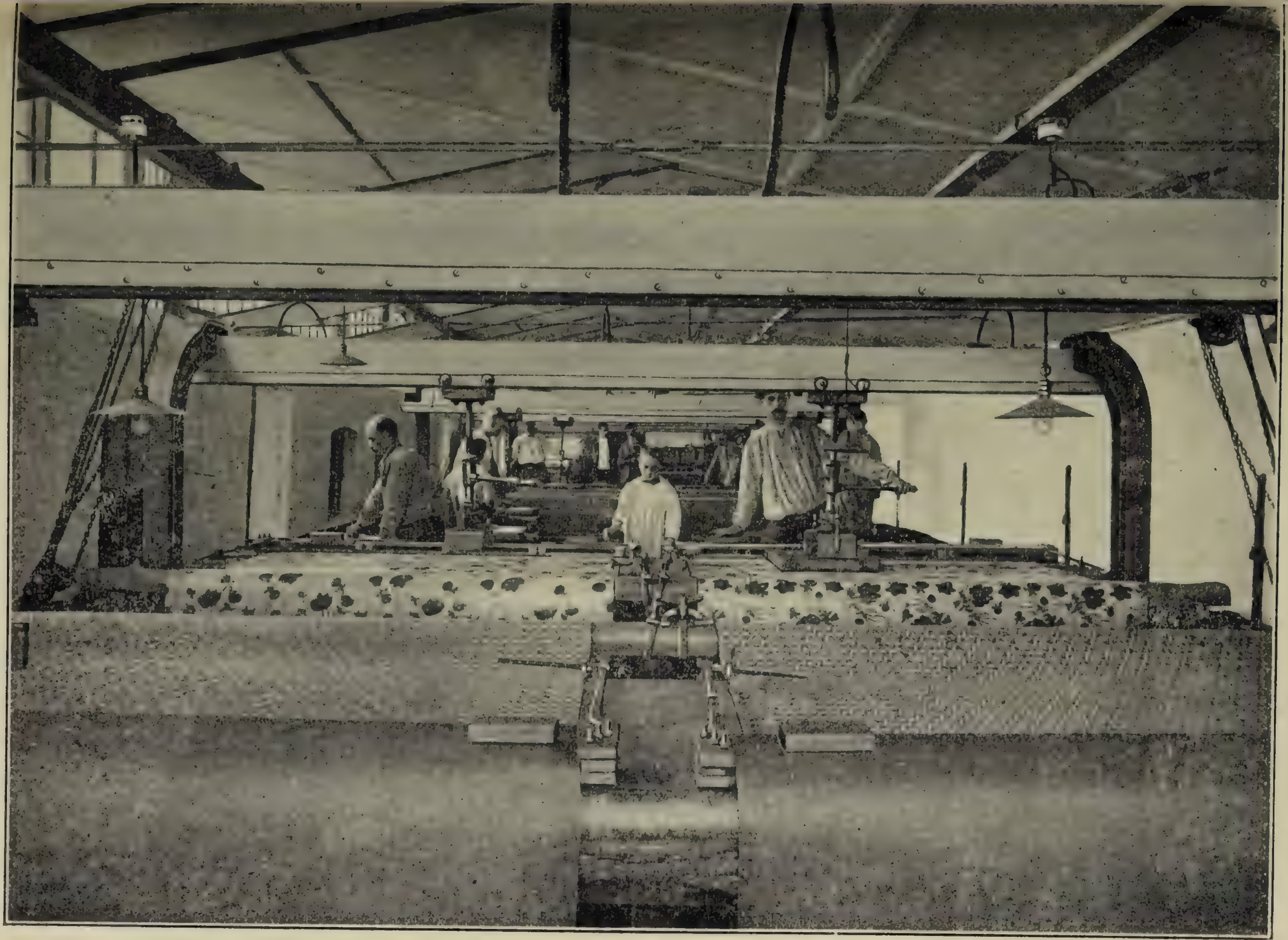
Year.	Imports.	Exports.
1901	21,634,180 kilograms	6,311,701 kilograms
1902	27,155,225 »	10,755,471 »
1903	32,948,869 »	13,000,252 »
1904	37,937,350 »	12,607,101 »
1905	26,660,399 »	6,318,419 »
1906	26,956,999 »	11,250,249 »
1907	27,296,203 »	9,367,454 »
1908	37,951,741 »	14,248,030 »
1909	51,762,000 »	20,556,000 »
1910	58,598,000 »	12,118,000 »
1911	47,588,000 »	12,756,000 »
1912	52,179,000 »	12,794,000 »
1913	67,428,000 »	19,163,000 »

Ground-nuts are mainly imported by way of Rotterdam, where an important margarine industry exists. It is the nearest port to Delft, where there is a large factory specially engaged in the handling of this produce.

Colza and linseed are imported at the ports of Amsterdam and Rotterdam. Among the other oleaginous grains and fruits which are treated here, palm kernels deserve special notice. The following table gives an idea of the importance of the trade in this article, the unit being tons of 1,000 kilograms.

Years	Imports (Special Trade)	Exports (Special Trade)	Excess of Imports over Exports
1877—1886	12,556	12,090	466
1887—1896	24,933	22,560	2,373
1897—1906	24,456	23,402	1,054
1906	23,242	22,539	703
1907	37,502	34,669	2,833
1908	35,568	31,567	4,001
1909	39,712	36,341	3,371
1910	42,592	39,726	2,866
1911	42,848	43,117	269
1912	56,863	48,439	8,424
1913	63,711	57,563	6,148

General view of a linoleum manufactory.



Printing section in a linoleum manufactory.

The palm-kernels come, for the most part, from Liberia and the Congo, and are imported principally at Rotterdam. About 800,000 kilograms of the seed of the *castor oil plant* are imported into The Netherlands.

A more important item is *copra*, a product consisting of the kernel of the coconut, broken up and dried, and supplying the material for the manufacture of soap, candles, margarine and vegetable butter.

This product was introduced on the Amsterdam market as early as 1875, but, for many years after, the transactions there were not to be compared with those for Rotterdam.

The copra imported into Europe comes principally from the following ports and countries: Java, Macassar, Sangir, Menado, Gorontalo, Padang, Singapore, Penang, Ceylon and Manila.

We give below a short statement of the imports and exports of copra in The Netherlands from 1887 (in tons of 1,000 kilograms):

YEARS	Special Imports	Special Exports	Excess of Imports over Exports.
1887—1896	6,705	5,679	1,116
1897—1906	30,517	27,966	2,551
1906	47,689	43,039	4,650
1907	52,632	43,369	9,263
1908	71,432	65,825	5,607
1909	62,941	57,251	4,772
1910	94,422	84,986	9,436
1911	91,680	77,954	13,626
1912	102,230	78,350	23,880
1913	100,635	82,356	18,279

Copra is exported principally to Belgium, Germany and the free port of Hamburg.

The trade in oils and oil-cakes, including to a large extent the oils not manufactured in The Netherlands, is no less important than that in oleaginous grains.

The following table gives the quantities imported and exported (special trade) of the principal kinds of oil in 1913:

Kinds	Imports (kilograms)	Exports (kilograms).
Olive oil	87,000	124,000
Coconut oil	16,686,000	5,377,000
Ground-nut oil..........	2,964,000	9,703,000
Cotton oil	26,439,000	702,000
Linseed »	551,000	25,443,000
Palm »	23,915,000	6,637,000
Colza »	2,179,000	463,000
Sesame »	1,502,000	302,000
Soya »	2,872,000	1,675,000

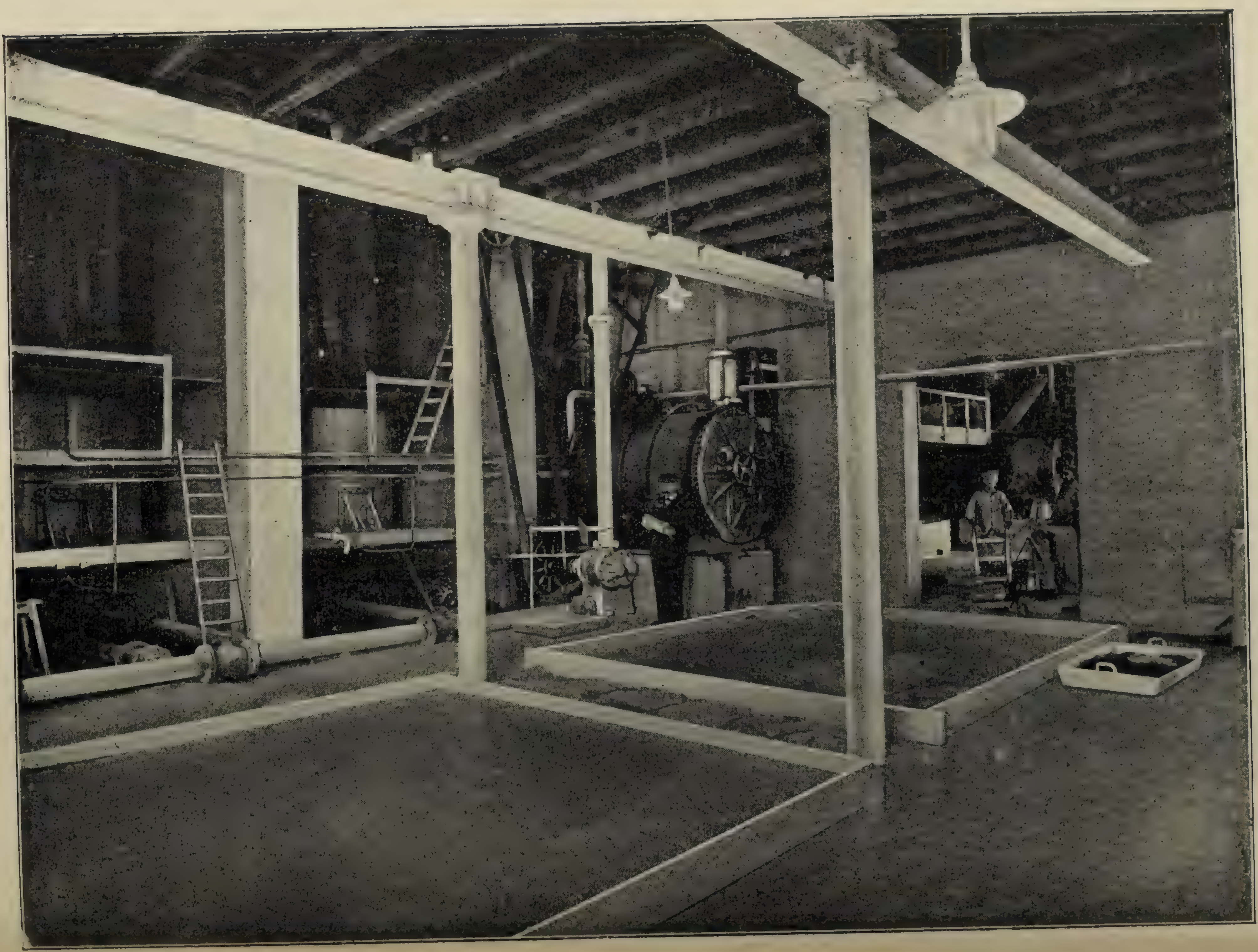
A comparison of these figures shows that as regards ground-nut, linseed and sesame oils, the exports are far in excess of the imports.

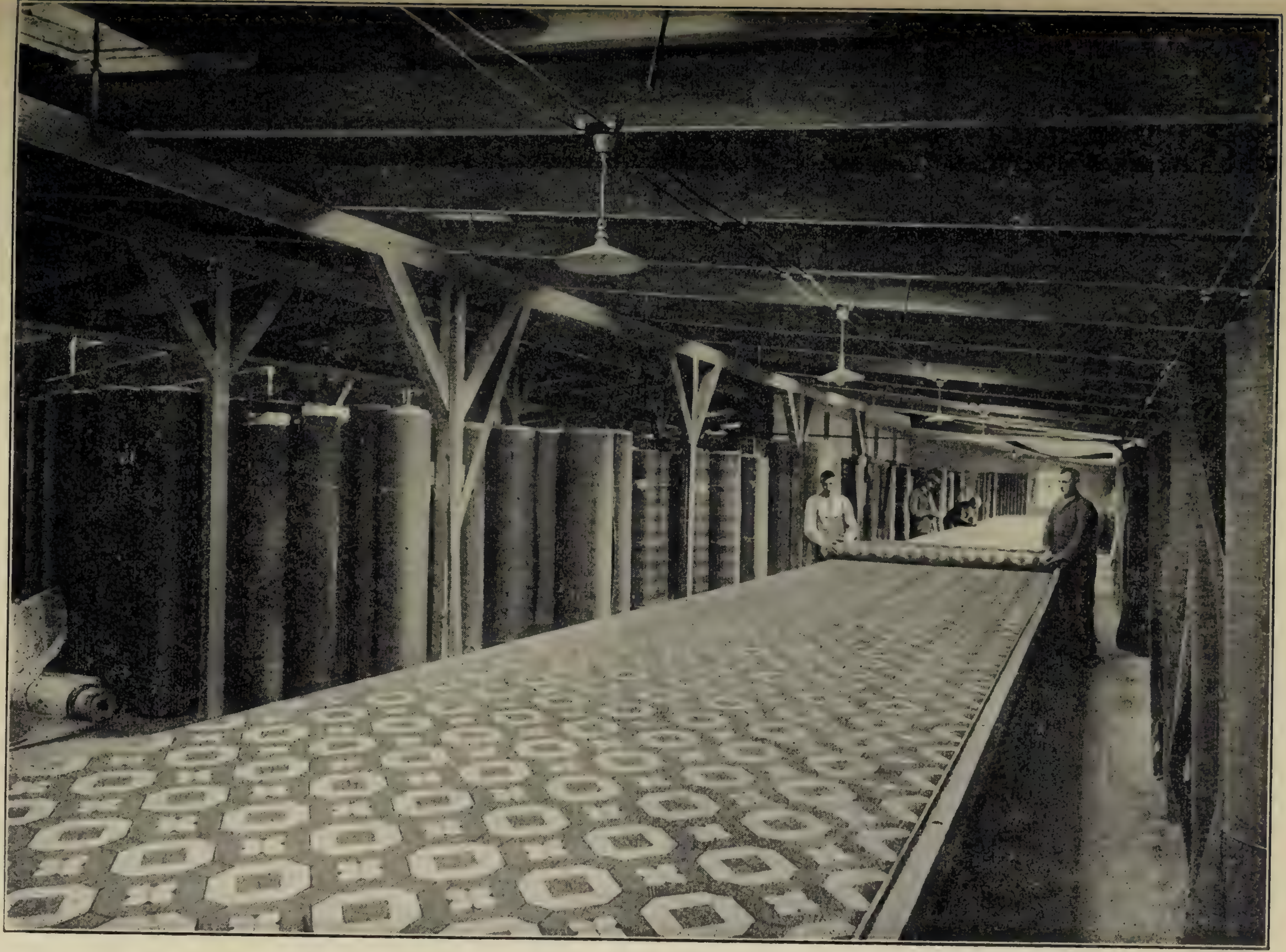
Linseed oil is sold both at home and abroad, notably in Great Britain, Belgium, Austria and the free port of Hamburg; colza oil is exported in smaller quantities. Rape and linseed oil-cakes manufactured by the Netherlands oil mills are nearly all sold in the country itself.

From ground-nuts is made an oil known as "Delftsche slaolie" (salad oil), which is a substitute for olive oil, while the oil-cakes are put on the market under the name of "Delftsche veekoeken" (cattle oil-cakes). These two products are the specialities of a large oil mill at Delft (at the same time, as regards food oils, the largest oil mill in The Netherlands), which sells these articles in various countries. The Delft factory produces oil both for direct consumption and for the margarine industry.

The exports of ground-nut oil-cakes and ground-nut flour are about four times as large as the imports. The soya beans have been recently introduced as a constituent for the manufacture of oils and oil-cakes; good results have been obtained. This oil is used in the manufacture of soap; and the oil-cakes can be used as a substitute for linseed oil-cakes.

Sesame oil is used in the manufacture of margarine and is exported to Sweden, Belgium, Germany, Great Britain and the free port of Hamburg.





Cutting of the linoleum.

LINOLEUM.

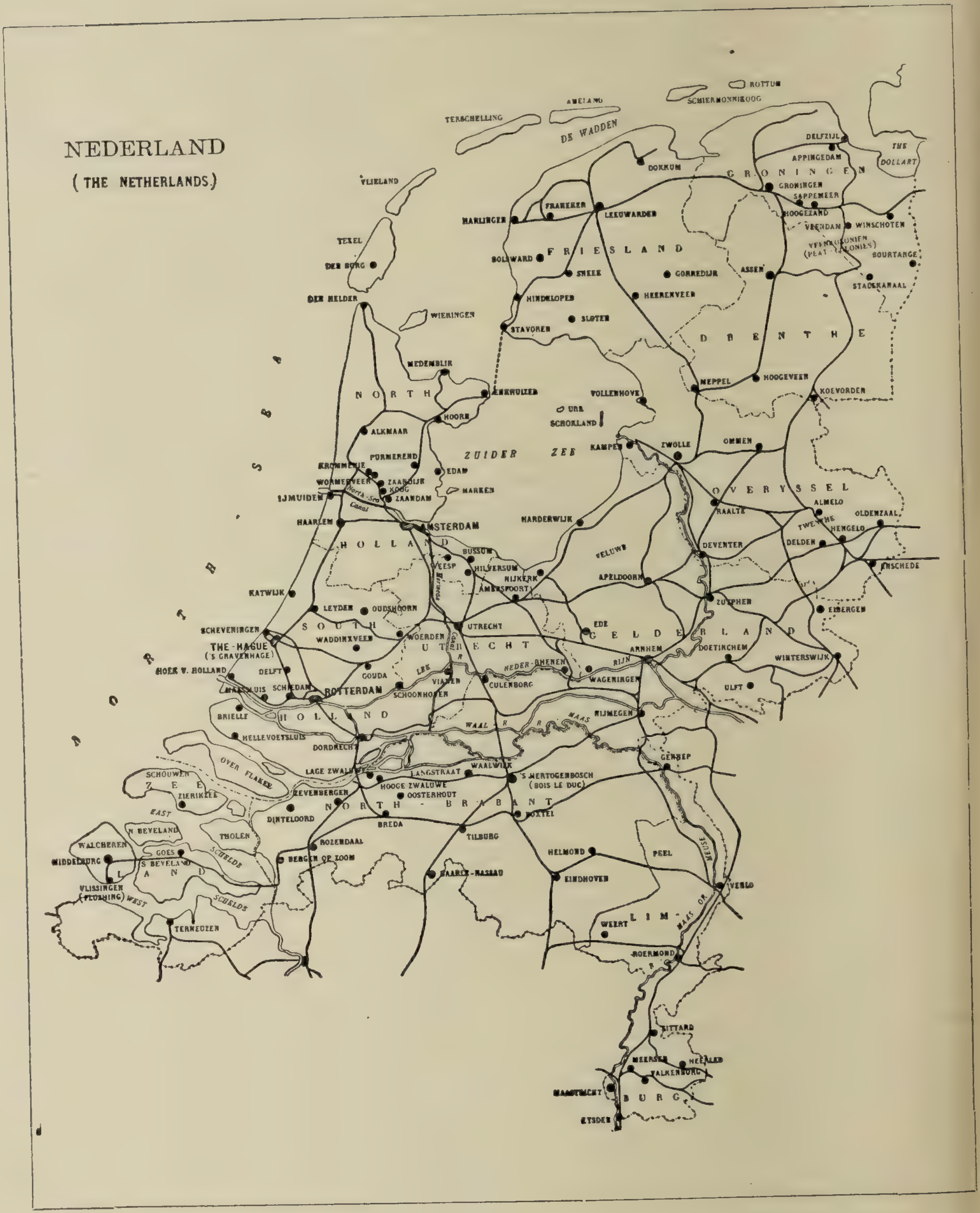
We may not close our chapter on the oil trade without mentioning a rather important branch of Netherlands industry closely connected with this trade, viz. the linoleum industry. Oxidised linseed oil, together with ground cork, being one of the principal raw materials for this product, it is not to be wondered at that this industry is located in the oil trade district, called the "Zaanstreek", more particularly at Krommenie.

On account of its superior qualities Netherlands linoleum has found an extensive market both at home and abroad.

As the official customs returns do not mention linoleum separately, we regret that we are unable to give a statistical account of the Netherlands trade in this product.

THE INDUSTRIES OF THE NETHERLANDS.

COMPILED BY THE COMMERCIAL DEPARTMENT OF THE
MINISTRY OF AGRICULTURE, INDUSTRY AND COMMERCE
WITH SPECIAL ASSISTANCE OF Mr. P. DOYER, SECRETARY
TO THE ROYAL NATIONAL RELIEF COMMITTEE.



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(THE NETHERLANDS)

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THE INDUSTRIES OF THE NETHERLANDS.

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PART IV.

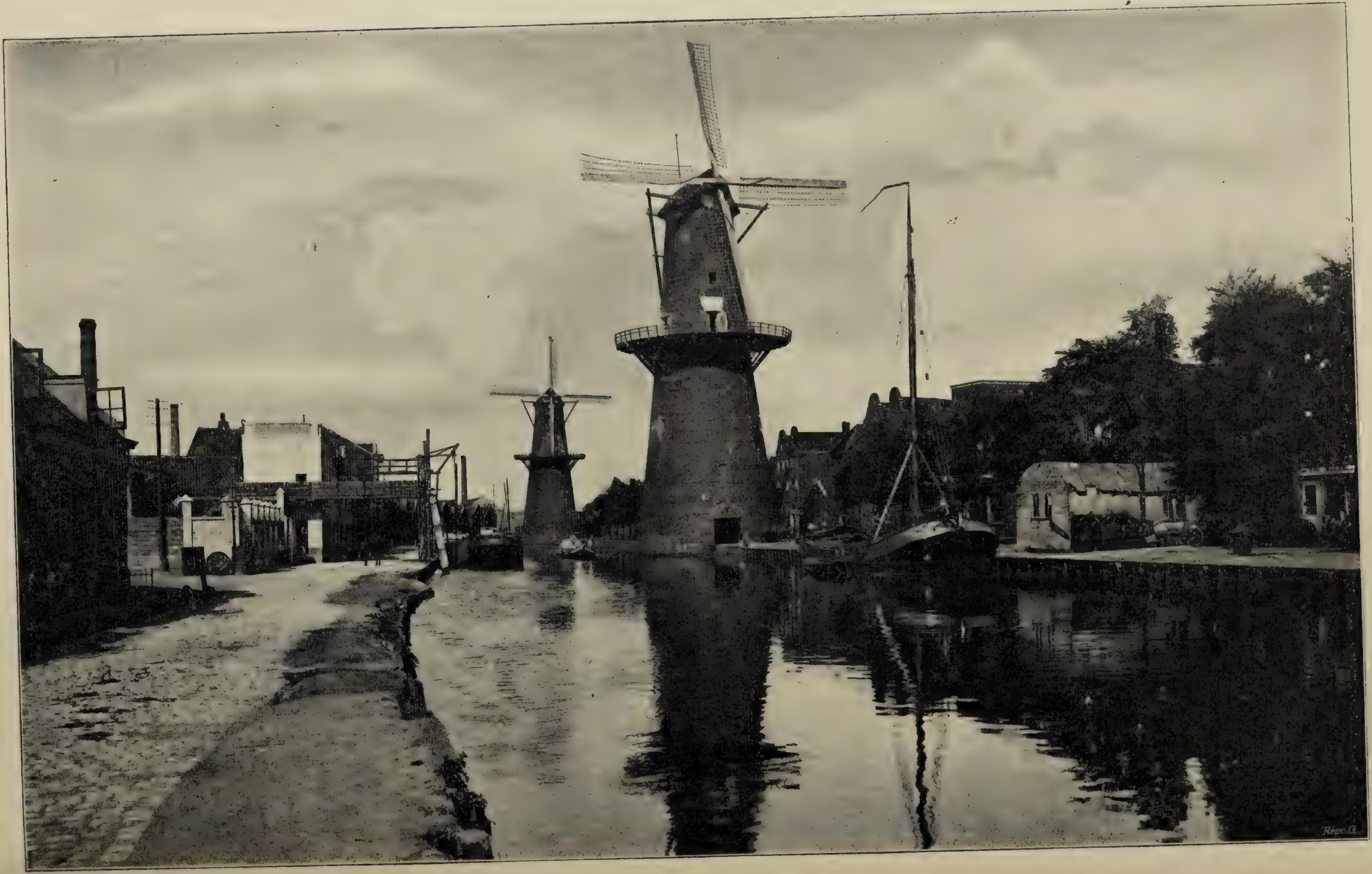
THE MANUFACTURE OF AND TRADE IN FOODSTUFFS AND DAINTIES.

THE industry which is engaged in the preparation or manufacture of foodstuffs and dainties in The Netherlands embraces an extensive group of very dissimilar trades and manufactures, which occupy a very large number of workmen, while their products form a considerable proportion of the total value of the general industrial produce of the country. Thanks to the great progress made in the methods of manufacture and the constant efforts of respectable manufacturers to furnish none but pure articles of excellent quality, several branches of this industry not only supply the needs of the country itself, but have developed into important export industries.

We append a brief account of the principal sections of this class of industries and trades.

THE CORN TRADE

From the earliest times, The Netherlands have carried on an important trade in corn, including not only the home produce, but also the produce of other countries for which The Netherlands served as a mart. Amsterdam was the principal market for foreign grain. Native cereals were dealt in both there and at Rotterdam and other minor ports and certain inland towns, such as Enkhuizen and Hoorn (both on the Zuyder Zee), Delft, Dordrecht and especially Middelburg.



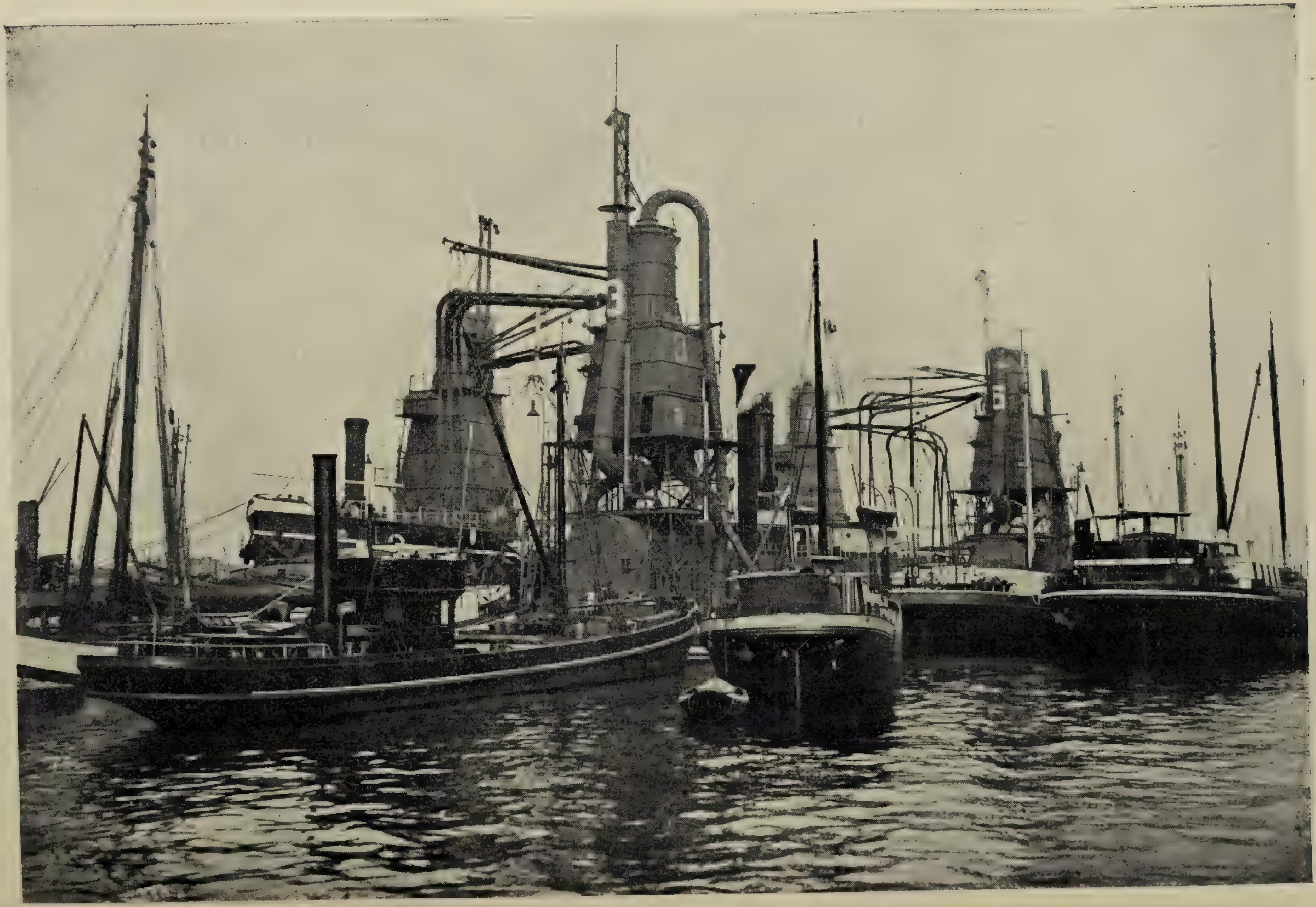
Grain wind-mills.

At the beginning of the nineteenth century, the position of Amsterdam in the international grain trade was still one of considerable importance; and it was not until a good many years after 1850 that the quantities of grain imported at Rotterdam began to exceed those received at Amsterdam. It was the founding of regular lines of steamers between the grain-exporting countries and Rotterdam, combined with the opening of the "Nieuwe Waterweg", the development of Germany and the increase in population of that country subsequent to 1870, entailing a heavy demand for foreign corn, that gave an enormous impetus to the importation of this commodity by way of Rotterdam, whereas the Amsterdam trade was steadily decreasing.

After 1870, Germany, from being an exporter, as she had been, became an importer of grain. As the Rhine was the obvious channel for the conveyance of these imports, Rotterdam became the centre not only for the conveyance of grain, but the market for grain from all parts. Thus we see that in 1913 about 90 °/₀ of the grain imported into The Netherlands, came through the port of Rotterdam. The exportation of home-grown cereals, which was very considerable towards the end of the eighteenth and the beginning of the nineteenth century, has gradually diminished; The Netherlands do not retain enough for their own consumption.

As is shown by the following tables, the excess of imports over exports of wheat, rye and maize, from 1847 to 1856, averaged 88,820 tons of 1,000 K.G. and in 1913, 1,398,000 tons. Oats, which were formerly exported in large quantities to Germany, showed, from 1847 to 1856, an average excess of *exports* of 28,400 tons, but in 1913 an excess of *imports* of 110,000 tons. Netherlands wheat (mostly grown in the provinces of Groningen and Zeeland) is still largely exported to Belgium, Germany, Great Britain and the West Indies, mainly for the purpose of mixing with other sorts of wheat.

The following table shows the imports and exports of cereals in The Netherlands:

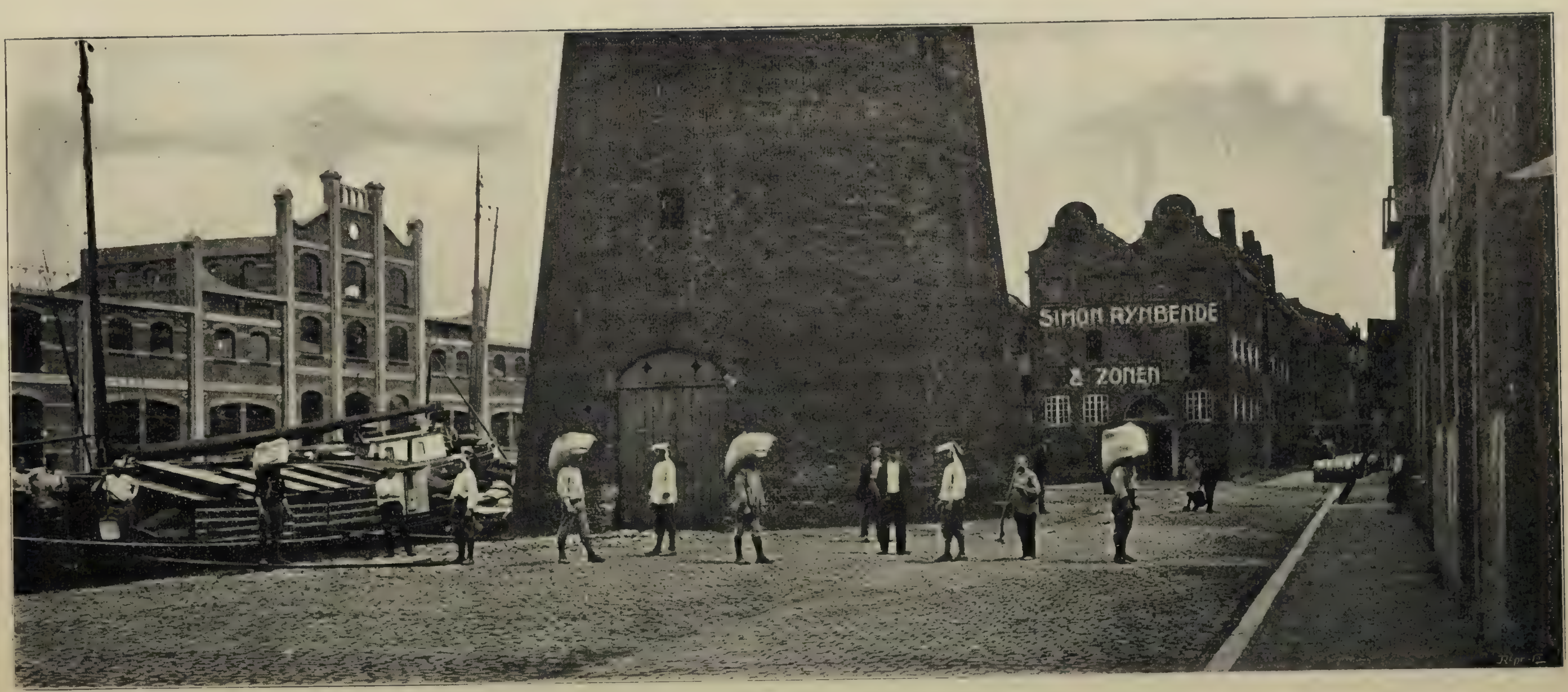


The grain elevators at work in the port of Rotterdam (180–200 tons an hour.)

In tons of 1,000 kilograms.

YEARS	WHEAT			RYE AND MAIZE		
	Imports	Exports	Excess of Imports over Exports	Imports	Exports	Excess of Imports over Exports
On the average:						
1847—1856	36,360	33,280	6,080	93,170	10,430	82,740
1857—1866	51,680	25,520	26,160	135,000	15,330	119,790
1867—1876	110,800	24,720	86,080	158,970	68,810	90,160
1877—1886	460,000	239,120	220,880	306,390	130,410	175,980
1887—1896	705,000	441,000	264,000	579,000	262,000	317,000
1897—1906	1,231,000	973,000	258,000	1,000,000	455,000	605,000
1906	1,211,000	902,000	309,000	1,157,000	457,000	700,000
1909	1,625,449	1,291,925	333,524	1,032,692	454,827	585,612
1910	1,933,059	1,586,686	346,373	1,125,514	461,165	664,349
1911	1,593,824	1,256,586	337,238	1,342,270	459,897	882,373
1912	1,790,000	1,400,000	390,000	1,507,000	622,000	885,000
1913	2,160,000	1,731,000	429,000	1,634,000	665,000	969,000

YEARS.	BARLEY AND MALT			OATS		
	Imports	Exports	Excess of Imports over Exports	Imports	Exports	Excess of Imports over Exports
On the average:						
1847—1856	37,050	18,655	18,395	1,000	29,400	28,400
1857—1866	65,455	26,195	39,260	3,400	26,450	23,050
1867—1876	76,700	25,740	50,960	4,250	34,900	30,650
1877—1886	127,855	44,330	83,525	61,700	79,100	17,400
1887—1896	276,000	154,000	122,000	168,000	159,000	9,000
1897—1906	443,000	279,000	164,000	351,000	306,000	45,000
1906	641,000	412,000	229,000	386,000	317,000	69,000
1909	753,520	449,573	253,947	438,704	337,310	103,394
1910	877,138	607,731	269,407	484,983	391,905	93,078
1911	962,000	689,000	273,000	516,692	419,851	96,841
1912	725,000	534,000	191,000	745,000	600,000	145,000
1913	953,000	704,000	249,000	562,000	452,000	110,000



The transport of grain from the lighter to the warehouses is still done in a rather primitive way, the grain being carried on the head by the members of the Bag-Carriers' Guild, a corporation originating in the 17th century.

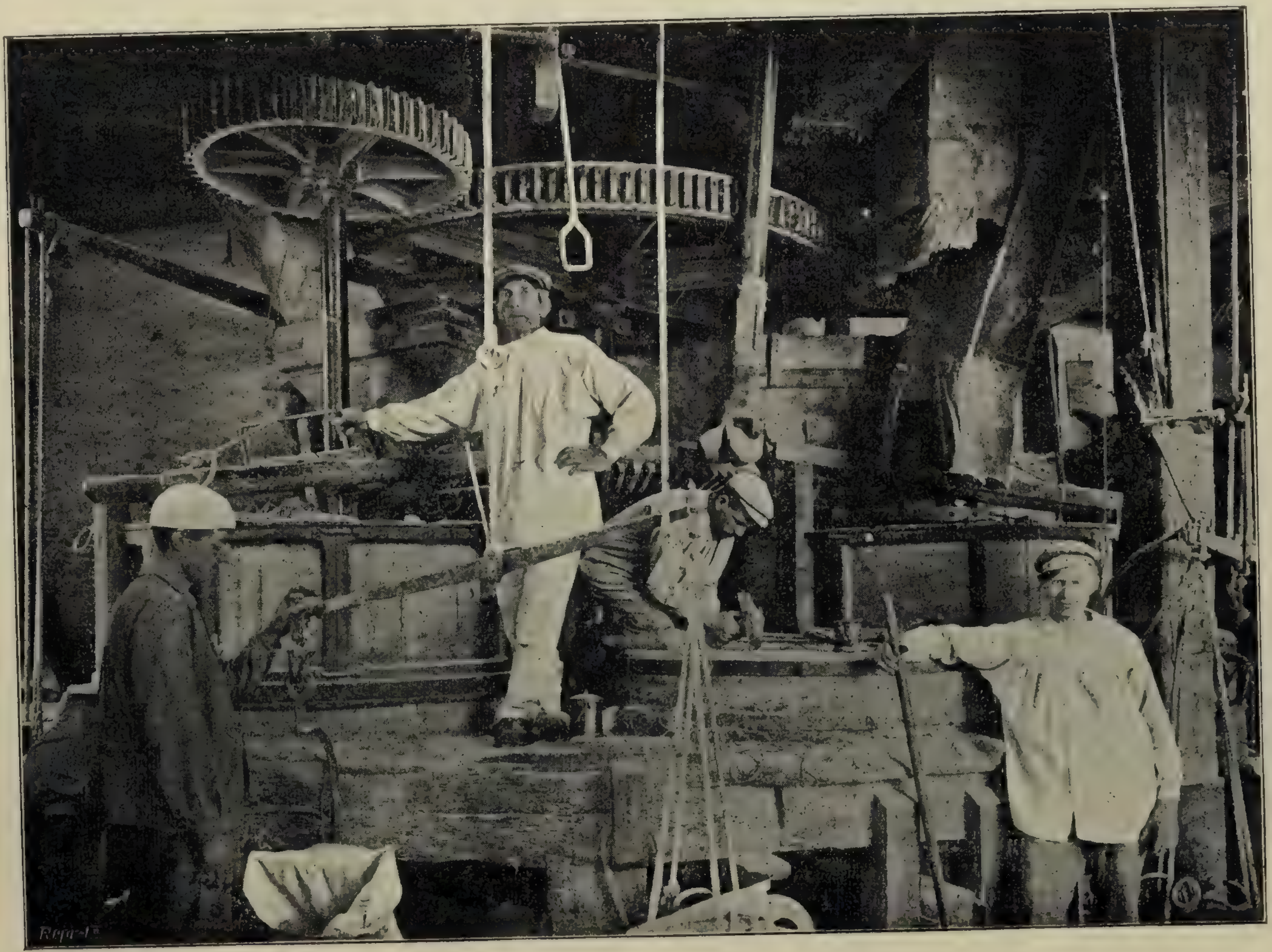
The improvement in the means of communication (steam navigation, the telegraph, etc.) enabled the foreign buyers to purchase the grain direct in the foreign markets; and this completely altered the character of the trade in The Netherlands, for, since that period, a large part of the grain imported in our country only comes there in transit, arriving mostly, as already stated, at Rotterdam. Nevertheless, the benefits derived by a seaport town from the lading and transhipment of such enormous quantities of cargo are by no means a negligible quantity.

Exclusive of the firms that work for their own account, the grain trade is at present in the hands of importers, either at Rotterdam, Amsterdam or in the interior, and of the representatives of the large firms established in the ports of origin, or in London, Liverpool, Mannheim, Düsseldorf, Antwerp and Paris.

The Grain Elevator Company (Graan Elevator Maatschappij) which owns these giant machines, handled in 1907 (the first year of its existence), with 2 machines, 206,681 tons of grain; in 1908, with 2 to 7 machines, 574,607 tons; in 1909, with 8 machines, 1,782,953 tons; and in 1911, with 12 to 16 of such machines, 2,907,000 tons. They can tranship or unload 3 million tons of 1,000 kilograms a year, at an average speed of 2,000 tons a day per vessel.

At Rotterdam grain was, until recently, warehoused only on a very limited scale. It happened pretty frequently that grain which could not be forwarded for the moment, because of the fluctuations of the market, was transhipped and temporarily stored in lighters. But, since this is a rather expensive method, the example of Amsterdam has been followed, which has a large silo fitted up in the most modern fashion and connected with an elevator; and Rotterdam has built a similar establishment of huge dimensions, capable of meeting every requirement, which was opened in March, 1911.

These silos also possess facilities for winnowing the grain and separating it from all foreign substances. Likewise it is possible to dry the grain more or less damaged by seawater, and by a rational treatment to restore its original excellence.



Interior of a small steam grain mill.

The "St. Job" warehouse and silo building on the St. Jobshaven at Rotterdam.

Now that unloading by means of elevators has become the rule, and the machine moves the grain direct from the sea-going ship to the receiver's vessel, the factor's duties are limited to supervising the transhipment.

The principal countries and ports sending their cereals to Rotterdam are:

Wheat. The German and Russian ports on the Baltic, the Russian ports on the Black Sea, Roumania, North and South America, British India and Archangel.

The great corn silo at Amsterdam.

Rye. The Russian ports on the Black Sea, Roumania, the German and Russian ports on the Baltic.

Barley. The Russian ports on the Baltic and on the Black Sea, Roumania, North America, the Prussian ports on the Baltic, Fiume and British India.

Maize. Netherlands East India, North and South America, Roumania, the Russian ports on the Black Sea and British India.

Oats. The Russian and Prussian ports on the Baltic, North America, the Russian ports on the Black Sea, Roumania and the Argentine Republic.

BARLEY.

Large quantities of barley, both native and imported, are peeled in The Netherlands and sold under the name of *gort.* There are special mills for the removal of the husks, which contain a large percentage of albumen and serve mainly for the purpose of fattening cattle. The best gort is made from a fat, heavy native barley, known as "Chevallier Barley", and from native winter barley. Pearl barley is also very well known in The Netherlands.

Although it does not constitute a national food, peeled barley is consumed in fairly large quantities in the country. In the neighbourhood of the Zaan (near Zaandam), there are three important barley mills, employing some 150 workmen. In addition, the country, as a whole, possesses about thirty large grain mills, with about 300 workmen, busied in the manufacture of peeled barley and buckwheat meal and spelt meal. Some of these factories are worked by engines, from which they derive their motive power.

FLOUR.

In the early part of the nineteenth century, the miller's trade was a small, private industry in The Netherlands, as in most other countries The grain was ground in mills worked either by wind or by water. The business was usually conducted in a homely fashion, that is to say, the baker or the private individual who made his own bread would bring his grain to the miller. After the introduction of steam as the motive power, foreign countries shot far ahead of The Netherlands in construction of large grain

A flour-mill at Leyden.

mills forming the transition between the small trade and the large industry. In The Netherlands, the position remained at a standstill as long as the duties on ground grain impeded the development of the miller's trade. But in 1851, when this tax was abolished and when the importation of cereals and the demand for flour both increased, our people also began to organize the milling industry. The old mills continued to work, but a few steam mills were founded, first, in 1856, at Rotterdam and, in the same year, another near The Hague, which started work with six pairs of French millstones and a 50-horse-power steam-engine. Here 1,500 H.L. of wheat were ground weekly, and the flour sold so well and so rapidly that it was decided to build a second mill beside the first, which was done in 1859. Soon after that, other factories were established in every direction, at Goes, Roermond, Vlaardingen, etc. Between 1870 and 1880, there were over 80 larger or smaller grain mills, producing large quantities of dressed flour. The mill industry then enjoyed a period of great prosperity. But in 1885, this industry experienced a great set-back through the invention of the cylinder process, which produced a much whiter flour and soon took the place of the old flat-millstone system. The Netherlands milling industry then entered upon an entirely new phase and concentrated itself in a few large undertakings, which worked with sufficient capital to be able to equip themselves in the very latest manner and to keep up with modern technical developments, so that thenceforth they were capable of grinding thousands of kilograms of cereals daily. Obviously, this state of things spelt disaster to the small mills, which disappeared one after the other. A grave crisis, in which several mills went under, was occasioned in 1895, mainly by the action of foreign countries and especially of France, whose flour benefited by an export bounty, in inundating The Netherlands with their flours. After some time there were only 17 factories working, the figure at which it stands today. These 17 factories have been constantly improved from the technical point of view. The cereals are automatically husked and ground, which necessitates only a restricted amount of hand labour. The total number of workmen employed, therefore, amounts roughly to no more than 900. Only two of these factories turn out rye flour as well as wheat flour.

The Netherlands mills use mostly foreign wheat. The millers buy it from the agents at Rotterdam, Amsterdam or Antwerp and import it themselves. Groningen wheat is the only native wheat ground in large mills. The other kinds, especially that grown in Zeeland, are ground in the mills which still work with millstones or in the smaller establishments. As, since the improvement in the milling industry, people no longer go to the millers for flour, the latter, so as not to leave their windmills unproductive, have taken to specializing in the production of undressed wheat meal, rye flour, flours of buckwheat, flax, Indian corn, oats, barley and other kindred products. Most of them, however, have realized that even in this way they would not be able to hold out in the long run if their mills were not worked by steam, gas, or some other of the motive forces which have become all the more indispensable inasmuch as, in the towns, they are being more and more surrounded by tall buildings and thus deprived of the full benefit of the wind. That is why most of the old mills, which gave so picturesque an appearance to the Netherlands towns and villages, have been either pulled down or stripped of their sails and caps and become clumsy shells, which nevertheless continue to serve for the same trade, now improved, or else are used for storing.

The Netherlands grain mills produce more than half of the wheat flour needed for the requirements of the country. With the exception of those which also carry on a bread-making business, they sell their products to the makers of bread and rusks, to the large and small bakeries and to the retail trade. They do very little in the way of export, as the duties on foreign flour in most of the surrounding countries are of a prohibitive character.

The flour factories also sell the by-products and residues of the milling industry, which are rich in albumen and form a nourishing food for both men and animals. Bran is exported in large quantities, notably to Germany.

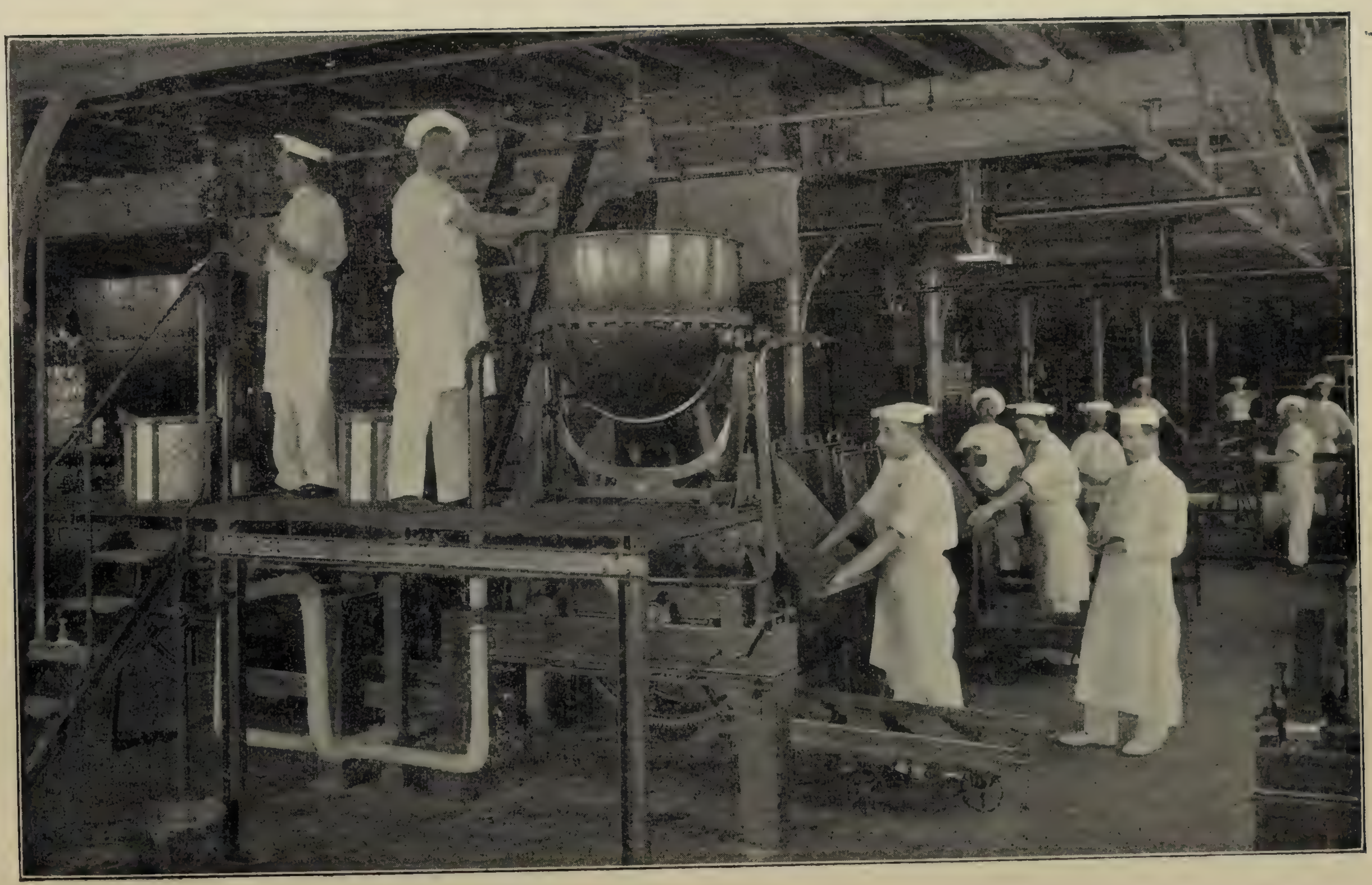
These three articles of daily consumption in The Netherlands, which form only one section in the trade, are manufactured either separately or in conjunction with similar articles, such as pastry, &c. This industry, therefore, takes different forms according to local conditions.

Sixty years ago, baking was practised in The Netherlands, as everywhere else, as a small trade. According to the number of his customers, the baker engaged a larger or smaller number of workmen, who acted indifferently as foremen, weighers, oven hands and so on. He made bread with the dough prepared by his own people and also from dough brought to him by his customers, who made dough at home and brought it in a mould or shape to be baked by the baker. This mode of baking still exists in some towns and rural districts. In 1855, when the mill dues were abolished, the first bread factory (steam bakery) was established.

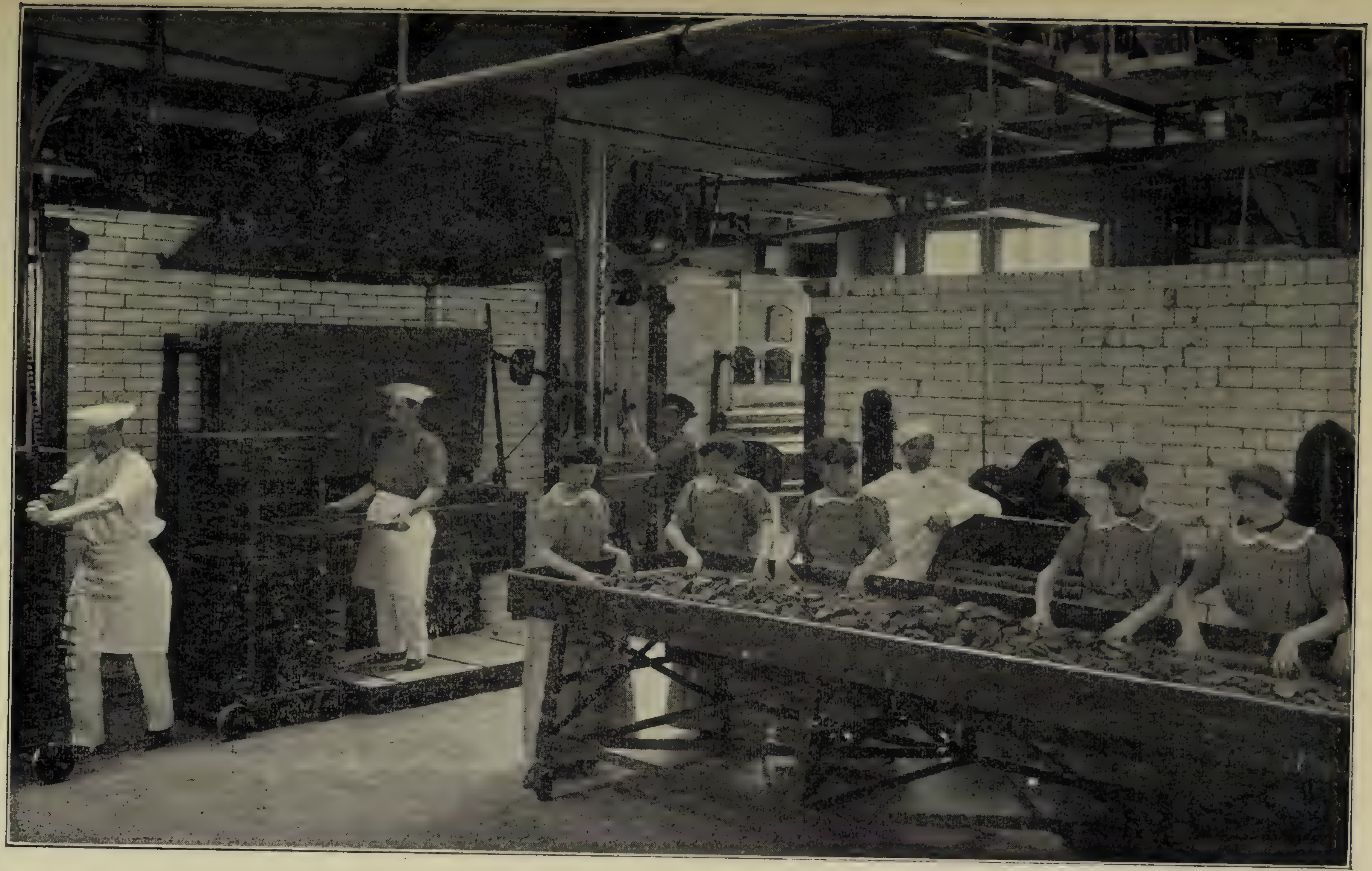
Dr. SARPHATI, a philanthropist to whom the capital owes its Palace of Industry, was the first to take this initiative. In founding a company for the erection and working of mills and bread factories, he attempted a thing which was new not only to The Netherlands, but to the whole world. Although at the beginning — and even amongst experts — people were sceptically disposed towards the bread factory — several of these have really passed through difficult times — the example set by Dr. SARPHATI incited to imitation and soon different bread factories arose.

Nowadays there are 29 bread factories, while 78 privately-owned bakeries and 20 co-operative bakeries have in the course of years developed in such a manner, that they also may be reckoned as belonging to the large scale industry.

These factories have, however, remained the exclusive prerogative of the large towns and of the more important provincial towns. They turn out large quantities of bread to supply the needs of the town itself and the neighbourhood, for the cost of carriage must necessarily be kept down. The bread is sold either by delivering it direct to the consumers,



View in a ginger-bread factory at Zaandam.



Another view in a ginger-bread factory at Zaandam.

by supplying it to retail shops or by selling it in the factories' own shops, established in different parts of the town.

In the villages and the small towns, baking has continued a trade as heretofore; but in the larger towns we find establishments occupying a position midway between the two kinds. As a matter of fact, at the time of the creation of new systems of ovens, mechanical kneading-troughs, &c., many bakers extended their originally very primitive establishments by installing motors and machinery, introducing the division of labour and devoting themselves to the baking of fancy bread, &c.

Another category of undertakings are those which, either in one or in different places, exploit a number of small bakeries, instead of producing all their bread in and distributing it from one central factory.

Besides the afore-mentioned categories there are the co-operative bread factories, providing their own house-to-house delivery and dividing the net profits amongst their members, either in cash or in tickets for a quantity of bread free of charge. In order to be the better able to compete, some factories, at the end of the financial year, return their regular clients, under the name of dividends, a fixed percentage on the amount consumed.

The bakeries, with the exception only of those in the country in some provinces, where *rye bread* is principally made, produce mostly *wheat bread.* On account of the much diminished use of rye bread in the larger towns, this is now mostly produced in the larger towns in special rye-bread bakeries. Further, there are in such towns special bakeries for *gluten bread for diabetic sufferers, Jewish unleavened bread*, &c.

The bakeries in The Netherlands usually employ native flour for wheat bread and also American, German, Belgian and French flour.

Of late years the prices of bread have varied between 16 cents (about 3¼d.) and 18 cents (about 3¾d.) for a milk loaf of about 1 kilogram (the exact weight is never observed in the trade). By way of a secondary article, the bakeries formerly made ginger-bread and rusks. In some towns, particularly in the north and south, they used to devote themselves to the manufacture of different sorts of ginger-bread, which gradually gave birth to several small special industries, whose products acquired a certain reputation, sometimes extending even beyond the frontiers. Thus we still have Deventer, Groningen, Bois-le-Duc, Breda and Frisian ginger-bread, all of which differ in composition and quality.

Lately, however (from 1890—1900), a few larger concerns have come into being, manufacturing rusks and ginger-bread wholesale and dispatching these (especially the rusks), packed in tin or cardboard boxes, both to the interior of the country and abroad, together with all sorts of attractive advertising devices. The result is that many bakers have now ceased to produce ginger-bread and rusks and buy from the factories such quantities of those articles as they require for their trade. Special factories of ginger-bread and rusks are found, for instance, at Amersfoort, Amsterdam, Geertruidenberg, Gouda, Koog-on-Zaan and Zaandam.

Important rusk and biscuit factories exist in Amsterdam (luncheon biscuits and captain's biscuits), Gouda, Rotterdam (captain's biscuits and dog biscuits), Schiedam and Schoten near Haarlem.

There are ginger-bread factories at, among other places, Alkmaar, Amsterdam, Bois-le-Duc, Breda, Briel, Deventer, Gorinchem, Groningen, Harlingen, Leeuwarden, Leyden, Mydrecht, Oosterhout, Rotterdam, Tilburg, Utrecht and Vlymen. The primary constituents of this industry are mainly rye flour, currants, raisins, candied peel, ginger, orange-peel and honey, of which the last comes to a large extent from Brittany, Bordeaux, Cuba, Chili and Mexico, for the native honey is not sufficient for the demand.

The Netherlands colonies form the principal market for rusks abroad. Next come South Africa and a few European countries.

In addition to the rusk factories, there are in The Netherlands some ten establishments which manufacture dessert biscuits (similar to the English mixed biscuits). The largest of these are at Apeldoorn, Dordrecht, Leyden,

A rice-mill at Zwyndrecht.

Mydrecht, Sloterdyk near Amsterdam, and Zwolle, and employ a total of 600 workmen. Their produce is sold for the most part in the country and in the Netherlands colonies.

Sir ERNEST SHACKLETON's South Polar Expedition in 1907 was supplied by a Netherlands biscuits works with biscuits which, according to Sir ERNEST's own letters, were found quite satisfactory. There are also a few factories of *fruit jelly, painine, meline*, &c., as for instance at Rotterdam and Haarlem, and there are others which manufacture *substitutes for candied peel*, since the appreciable increase in the import duties on this latter article.

Vermicelli is a special product which must also be mentioned. It is prepared with rich flour and gluten. There are two vermicelli factories in The Netherlands

RICE.

Rice, which constitutes a largely-consumed foodstuff in The Netherlands, is imported mainly from Java, Rangoon, Bassam, Saïgon and Japan.

At least 75 % of the rice exported from Java finds its way to the Netherlands market. It comes principally from Cheribon and the private estates in the residence (province) of Batavia. The Java rice imported into The Netherlands is divided into four sorts, according to quality: selected table rice, white rice, first quality rice and good ordinary rice. The sales are effected in this country through the medium of a broker, usually on unloading. A part of the Cheribon rice is sold at Batavia by subscription. This last method is also sometimes followed in Amsterdam and Rotterdam, for rice received in consignment.

The Netherlands buy the rice that comes from British India and Cochin-China in London, where the large firms established in the Far East have their agents.

We append the figures from the Netherlands Statistics of Imports, Exports and Transit (special trade):

In millions of kilograms.

YEAR.	Imports.	Exports
1901	183	84
1902	221	105
1903	222	112
1904	235	126
1905	221	117
1906	252	123
1907	253	132
1908	300	158
1909	331	162
1910	351	204
1911	333	194
1912	332	201
1913	408	225

These figures prove that the rice trade in The Netherlands is an extremely important one. They also show that the exports have not increased in quite the same proportion as the imports during the last ten years, which proves that the consumption in The Netherlands has increased.

The rice imported is for the greater part sold after undergoing only the first peeling process. It is made fit for consumption and technical uses in the rice mills, for which reason very nearly the whole of the rice imported into The Netherlands is bought by the large rice mills, which, after manipulating it, place it on the market as "picked rice".

The care which is given and which has always been given to this industry (a very ancient Netherlands industry) has established throughout Europe the excellent reputation of the Netherlands rice mills, which were formerly very numerous in the neighbourhood of Zaandam. In 1855, there were quite 50 wind rice mills on the banks of the Zaan, but this number has diminished since the introduction of steam as the motive power. There were only 3 remaining in 1896 and, in 1909, no more than one. It is, therefore, to the establishments worked by steam, gas or electricity that we owe the remarkable increase in the production. From this point of view, the largest of these rice mills fills the place of at least 40 of the old windmills, producing, on an average, 1,000 tons a year. The Netherlands, at present, contain, in addition to the windmill at Zaandam aforementioned, 9 rice mills worked by steam, including 1 in Amsterdam, 2 at Rotterdam, 2 at Zaandam, 2 at Wormer, 1 at Wormerveer and 1 at Zwyndrecht, employing 600 hands in all.

They produce three articles: *hulled table rice, pounded rice for technical uses* (starch-making, brewing, &c.) and, as waste, *ground rice*, or *rice flour*, which, like the damaged rice, is used for cattle food. These products are sold partly to the corn chandlers and other retailers at home and partly abroad, to nearly every European country, excepting those where the duties are too high to allow of the importation, to Africa, the West Indies and South America.

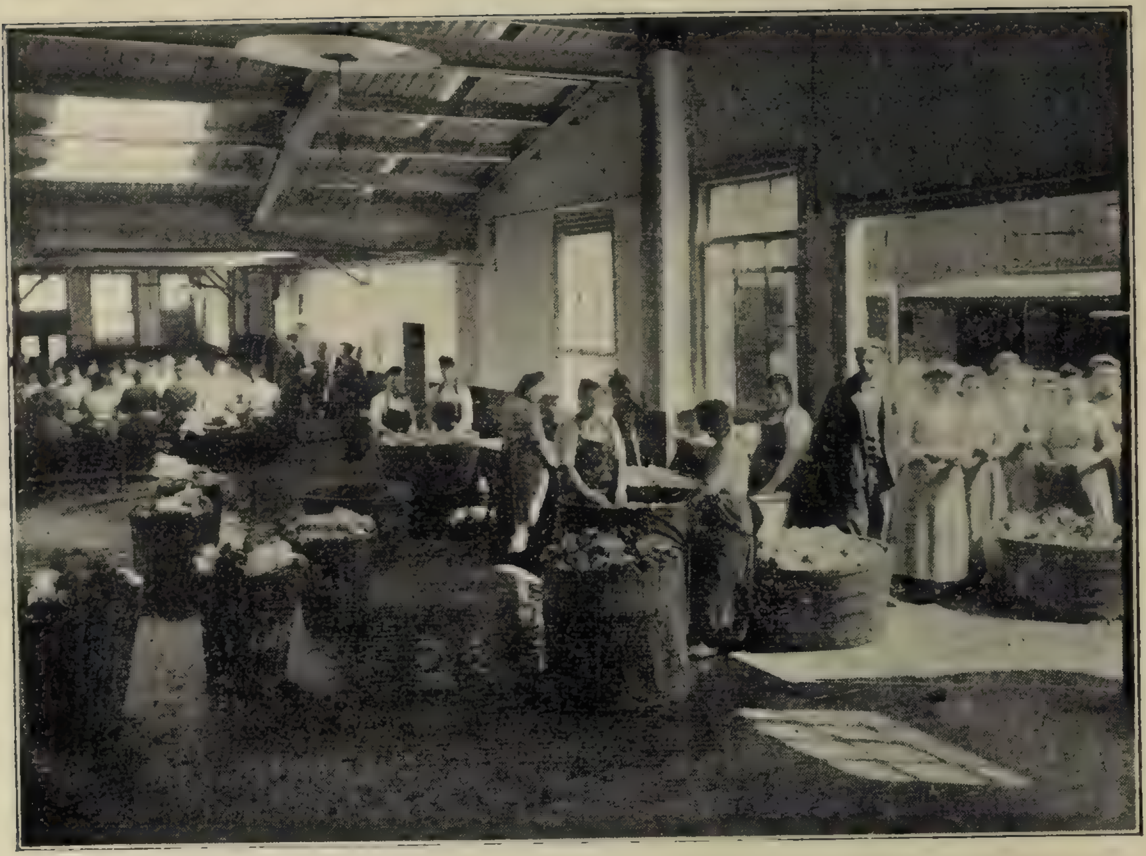
PRESERVES.

One of the most important industries in the foodstuff section is the manufacture of preserves, which owes its increase not only to the development of agriculture, market-gardening, cattle-rearing and dairy enterprise in The Netherlands, but also to the excellent reputation which it has acquired through the fine quality and purity of its products.

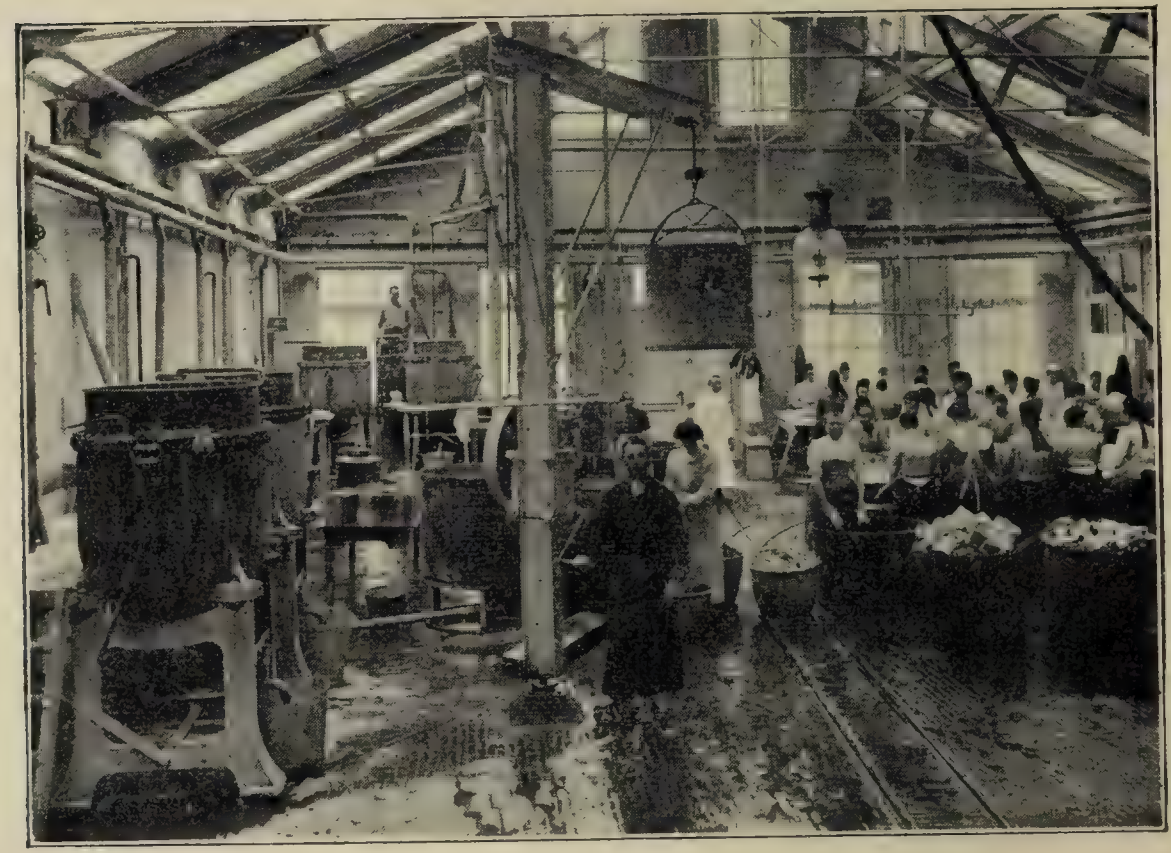
This industry is divided into four principal parts: the preparation of preserved meats; the manufacture of preserved milk; the preparation of jams and preserved, home-grown vegetables; and that of soups, fish, sauces, pickles, puddings, &c.

All these branches are represented by different larger or smaller factories, including some of great importance which will easily bear comparison with the best in any foreign country.

The industry engaged upon the production of *preserved meats* embraces the preparation of these articles in the most comprehensive sense and, therefore, comprises *salt* or *smoked meats*, *extracts of meat*, *potted game*, &c. These articles are finding more and more numerous outlets abroad



Vegetable washing department in a Leyden preserves factory.



Kitchen in the same factory.

Tins manufactory in the same factory.

Expedition department in the same factory.

as well as in the country itself; and this in spite of the fierce competition of America and Australia. Outside The Netherlands, which purchase them for their own consumption and for the victualling of ships, these succulent products are sold in the Netherlands Indies, Belgium, Germany, the Straits Settlements and Africa (the Cameroons, the Gold Coast and South Africa).

Sterilization department in the same factory.

Important factories for the production of these articles exist in every part of The Netherlands, including Amsterdam, Almelo, Breda, Borne, Beverwyk, Bois-le-Duc, Culemborg, Deventer, Doetinchem, Gorinchem, Groningen, Leeuwarden, Leyden, Maastricht, Olst, Rotterdam, Utrecht, Vorden, Winschoten and Wilp, or about 25 places in all.

The industry in *preserved milk* appears under different forms in The Netherlands. We may mention as the principal products, capable of satisfying every requirement of nutritive value and health, the following: *Pasteurized* and *sterilized milk*, *condensed milk* and *lactose* or *sugar of* *milk,* in addition to several others, such as *therapeutical products* for the use of infants and invalids.

Whereas the condensed milk is sold almost exclusively in foreign countries, including the tropical regions, the Pasteurized milk, of course, can be sold only in the country itself.

The consumption of Netherlands sterilized milk abroad is constantly increasing, as for instance in England, where milk in the form of powder finds one of its principal outlets.

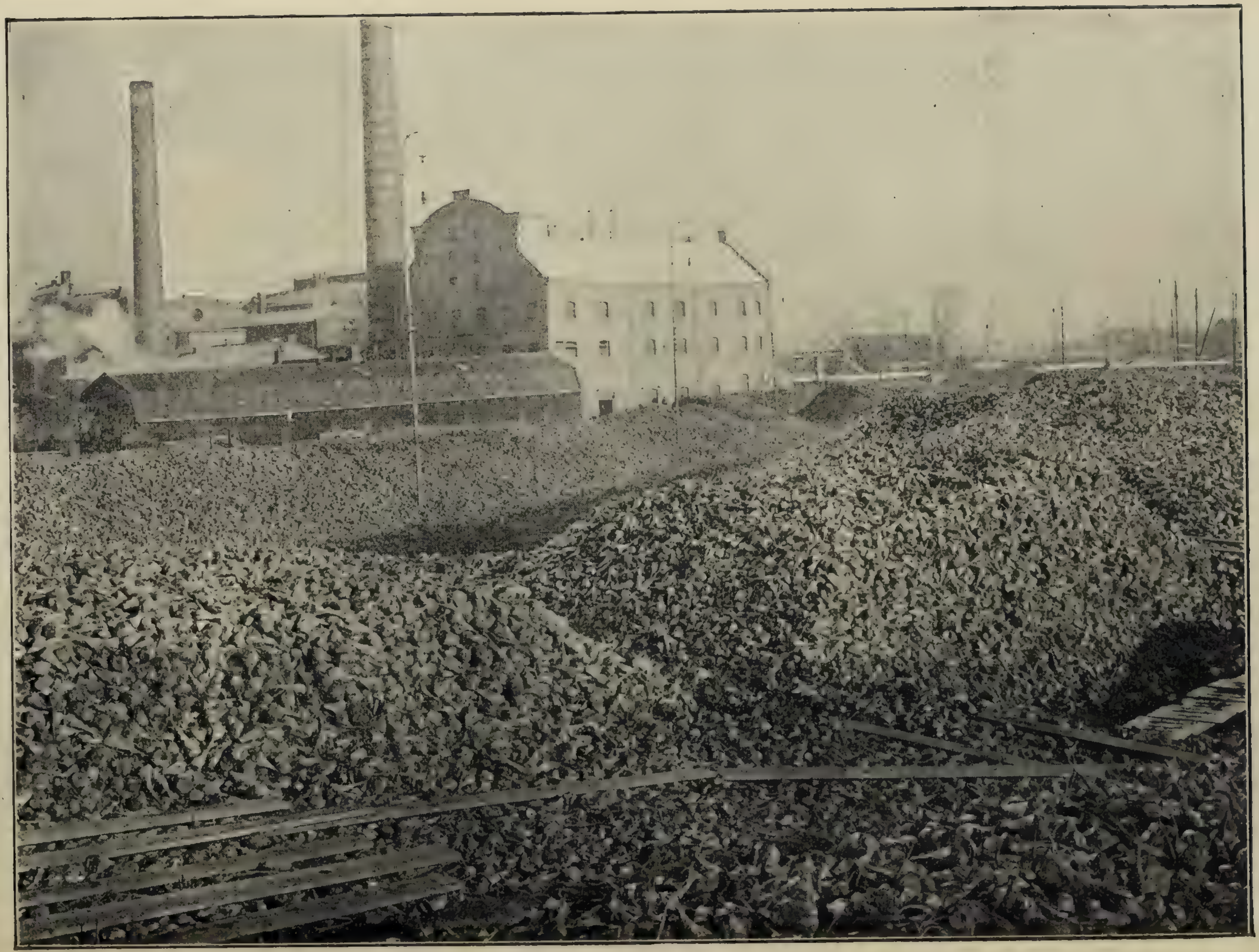
There are important factories of preserved milk at Bolsward, Beemster, Heenvliet, Limmen, St. Nicolaasga, Purmerend, Vlaardingen (these seven factories all belong to one large company, having its head office at Vlaardingen), Amsterdam, Bergen, Gorinchem, Hoorn, Kampen, Naarden, Nymwegen, Rotterdam, Terwolde, Uithoorn, Vreeland, Weert, Wapenveld, Zoetermeer and Zwolle. There are about 35 in all, of greater or lesser importance, and employing some 2,000 workmen.

The vegetables and other preserved foods find a sale both in The Netherlands and abroad (in the Netherlands colonies, England, the British colonies, South America, Turkey, Persia, &c.). The exports to England assumed a notable increase after the participation of The Netherlands in the Grocers' Exhibition held in London in September, 1908.

The most important manufactories of *preserved vegetables, fruits, soups,* &c. are in Amsterdam and at Alkmaar, Beverwyk, Bois-le-Duc, Broek-op-Langendyk, Breda, Groningen, Haarlem, The Hague, The Hook of Holland, Leyden, Loosduinen, Medemblik, Noord-Scharwoude, Ryswyk, Rotterdam, Tiel and Ysselmuiden.

SUGAR.

As long ago as the time of the East and West India Companies, a great quantity of raw sugar-cane was imported from Java, Surinam (Netherlands Guiana) and other districts, which was the cause of a brisk sugar trade, especially in Amsterdam, and, at the same time, created a sugar-refining industry which soon took a prosperous form.



Beetroot sugar manufactory at Halfweg.

In the seventeenth century, the sugar refineries of Amsterdam, Rotterdam, Dordrecht and Middelburg supplied the greater part of Europe, while the sugar trade kept a fleet of at least 200 ships constantly on the high seas.

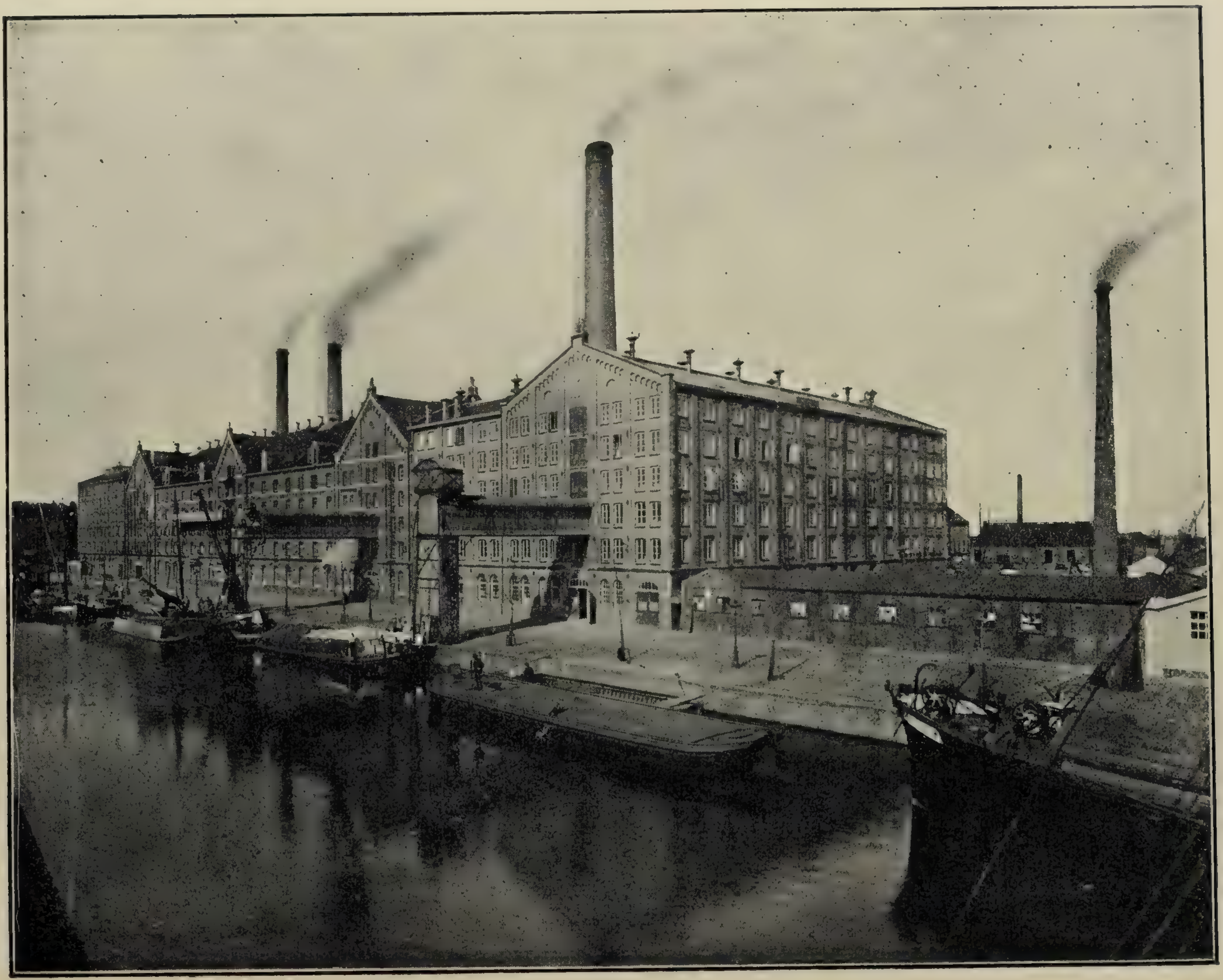
After becoming the centre of the sugar-trade and industry, The Netherlands was able to maintain this position, in spite of occasional periods of depression, until the end of the eighteenth century, when both trade and industry fell entirely to pieces.

Thereupon, attempts were made here as elsewhere, to use MARGRAF's invention for making sugar out of beetroot.

At last in 1858, after the first attempt in 1811, which had not succeeded, the manufacture of beetroot sugar was established in The Netherlands, for in that year the first factory was founded at Zevenbergen, followed, in 1860, by another at Dordrecht, then another at Oudenbosch and, in 1864, others still at Roosendaal and at Halfweg, near Amsterdam. Others were added successively, with the result that, at present, there are 27 of them, employing about 7,500 workmen (during the busy season), 17 of which are situated in the western portion of North Brabant, near the centre of the beetroot growing district. Zeeland possesses a co-operative factory.

Of late years, the productive capacity has greatly increased, because of the enlargement of the factories and frequent technical improvements. The output has been more than doubled. The largest of the 27 factories is at present able to deal with 1,400,000 kilograms of beetroot as against 120,000 kilograms in 1885. Indefatigable efforts have also been made to increase the yield of sugar in the beetroots, by dint of improving the methods of cultivation; and these efforts, which have been fully crowned with success, in their turn constitute an important factor.

During the last 25 years, therefore, industry and cultivation have worked hand in hand for their mutual development. Between 1866 and 1870, the area planted with beetroot in The Netherlands averaged 6,580 hectares annually; from 1891 to 1900, 30,090 hectares; and, in 1913, it stood at 64,824 hectares. One-sixth, at most, of the total produce



View of a sugar refinery at Amsterdam.

of beetroots is exported, principally to Belgium. In 1887/88, the beetroot sugar factories of The Netherlands produced 40 million kilograms of raw sugar; in 1897/98, over 111 million kilograms; at the moment, about 200 million kilograms (allowing, in kilograms, for tested sugar at 100 %).

The number of sugar refineries has greatly diminished of recent years, the industry having become gradually centred in a few large establishments, possessing a great power of production. There are 11 of these in all, two of the largest of which are at Amsterdam. These two establishments employ 1,150 workmen, and their production exceeds that of all the other refineries put together. In 1911, the larger of the two used over 105,000,000 kilograms of raw sugar in its gigantic works, in which 24 enormous boilers furnished the motive power; the other used 56,000,000 kilograms. The factories of home-grown beetroot sugar are not yet able to supply the immense demands of the raw material, but they are coming nearer and nearer to attaining this result. In 1902, the balance of imports of raw beetroot sugar in The Netherlands amounted to 89,049,970 kilograms; in 1911, it had fallen to 8,377,000 kilograms. Cane sugar (Colonial sugar) is used in the Netherlands refineries.

The produce of the sugar refineries consists of *loaf sugar*, *lump sugar*, *crystallized sugar* and *moist sugar*. A secondary product is so-called "*bastard sugar*." The Netherlands are important purveyors of these products to the other countries of Europe. In 1913, they exported 159,000,000 kilograms of sugar candy, moist sugar and bastard sugar; their largest customer was the United Kingdom. Next came Norway (for bastard sugar), Turkey, &c.

In The Netherlands themselves, the consumption of sugar is hindered by a high excise duty which, in 1913, brought about 27,000,000 guilders (about £ 2,250,000) to the Treasury.

The syrupy by-product of beetroot sugar manufacture, *treacle (molasses)*, is employed in the manufacture of alcohol or for cattle food. The by-product of the refineries is *candy syrup*, which, after being purified, is ready for consumption and considered the best of existing syrups.

The Netherlands also make *apple syrups, raspberry syrups* and syrups of other fruits and *potato starch*. This last glucose has been mentioned in the pamphlet on the starch industry. Apple syrup was formerly a special product of Limburg, where the growers themselves made it. At present, this article is more often made in conjunction with other fruit syrups, in factories which also use imported apples as their raw material.

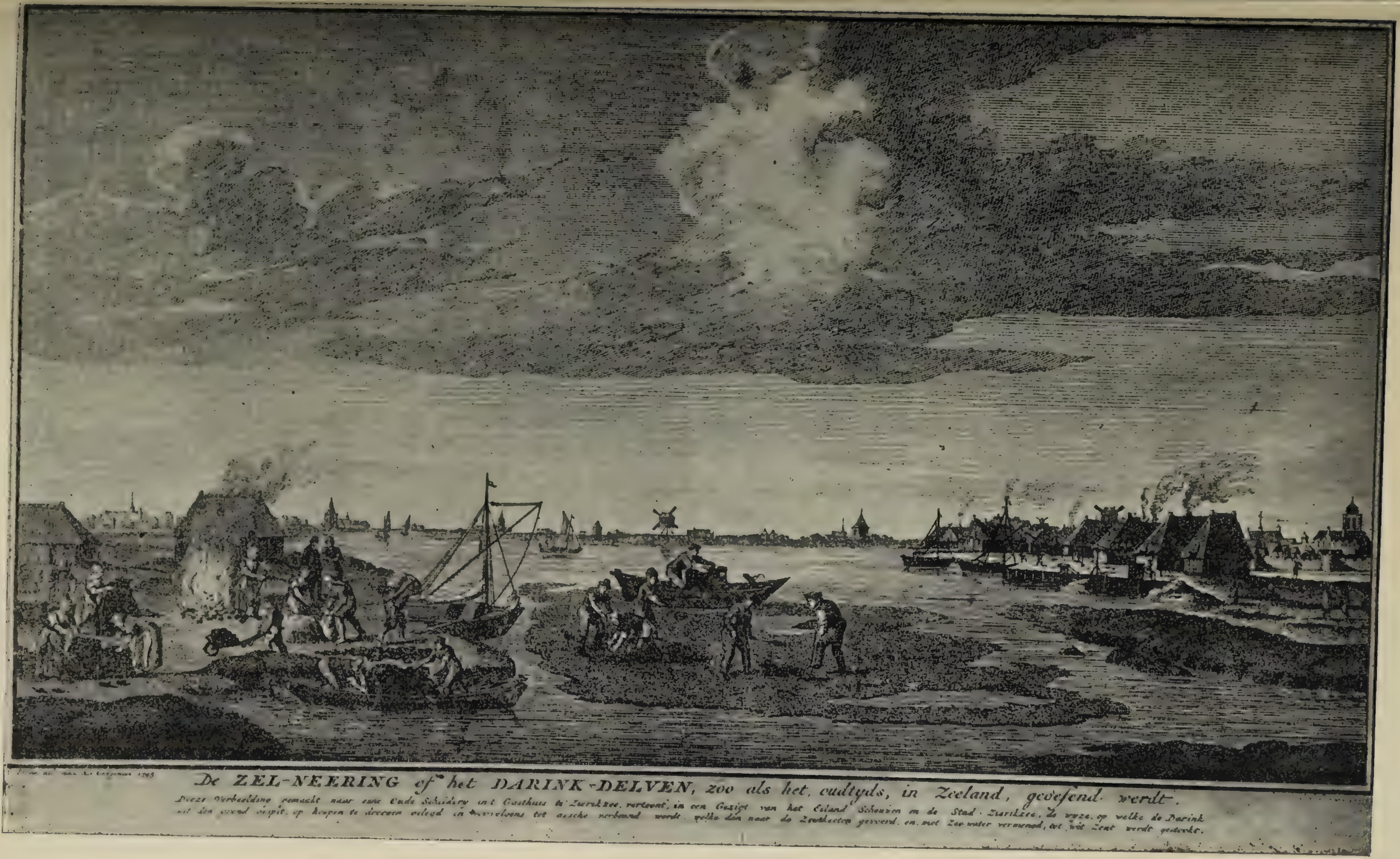
Well-known factories of candy syrup exist, among other places, at Amsterdam, Dordrecht, Gouda, Groningen, Roosendaal and Rotterdam; some of these factories are at the same time sugar refineries.

There remain to be mentioned under this heading, factories for the production of *sweets, peppermint drops*, &c., which, for the most part, also make chocolate. There is a large number of these, dispersed all over the country and varying greatly in importance. The largest are at Amsterdam, Breda, The Hague, Rotterdam and Sneek.

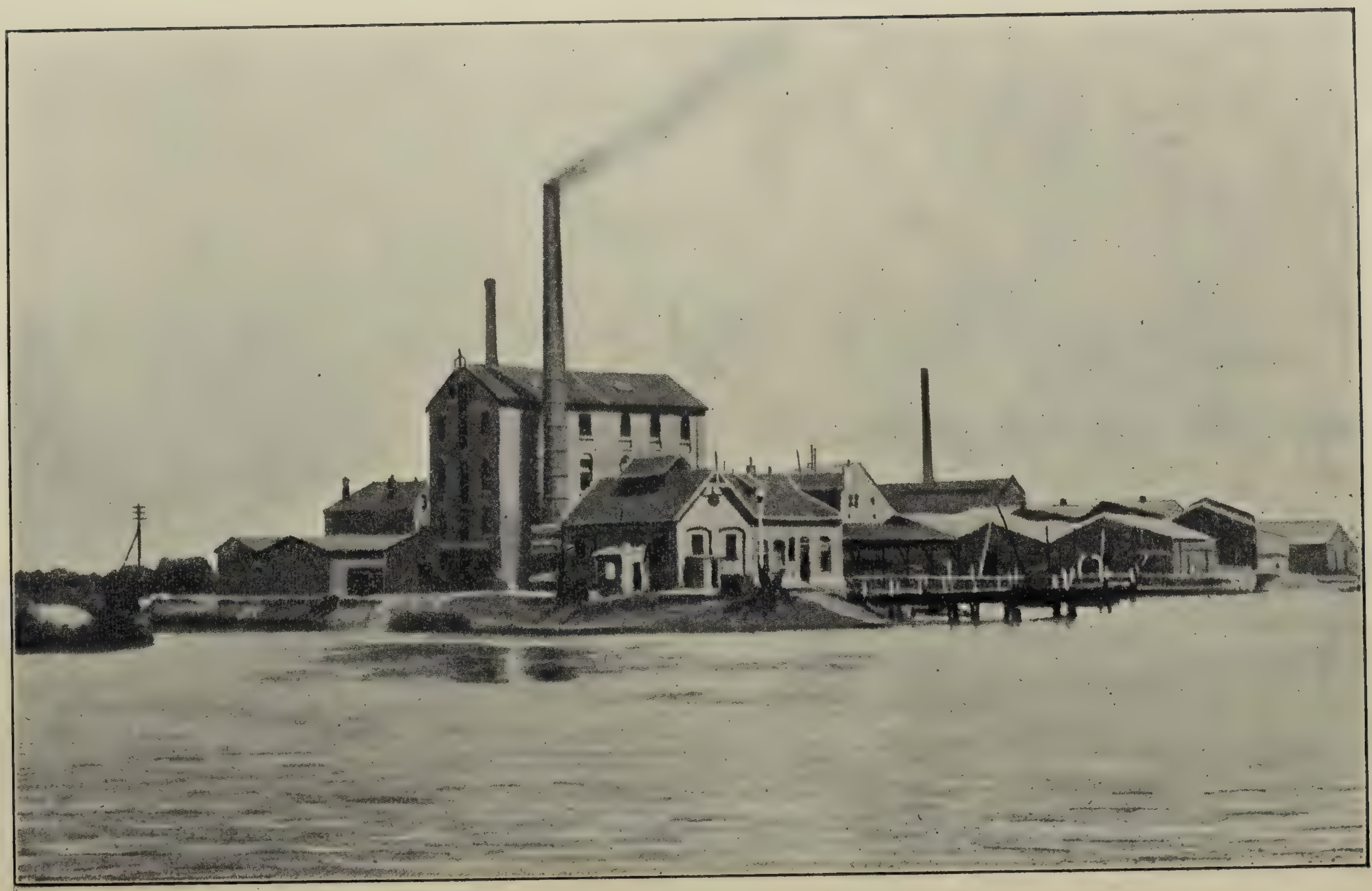
SALT.

In olden times salt was required in fairly large quantities in The Netherlands on account of this country's flourishing fishing industry, and a salt industry was already in existence. Salt was then made in The Netherlands by burning Zeeland peat, which was saturated with sea salt. The ashes left over from the process of combustion contained salt, which was extracted by a purifying process. In many Zeeland towns salt-burning (known as *selbornen*) was a trade that provided a great deal of occupation previous to the fifteenth century; but afterwards the removal of the peat for burning (known as extraction of *darinck*) was repeatedly prohibited, because of the injury which it caused to the soil.

During a transition period, the place of this salt-burning was taken by extraction of salt from sea water, which was effected by allowing the sea water to flow from the top of a heap of branches which were collected for this purpose and which retained the impurities, while the water, in its course,


De ZEL-NEERING of het DARINK-DELVEN, zoo als het, oudtyds, in Zeeland, geoefend werdt.

Reproduction of an old picture, representing the ancient manner of making salt, by burning Zeeland peat saturated with sea salt.



A salt-works near Rotterdam.

evaporated to a greater or lesser extent. In this way, a stronger, although still rather weak saline solution was obtained, which was made to evaporate in flat, open receptacles, until the salt was separated.

Both methods of salt production, however, produced only a limited quantity, while the fishing industry required larger and larger quantities. Therefore raw salt, known as rock salt (*klipzout)* was imported from abroad, mainly from France and Portugal and also from England. It was employed by first dissolving it in sea water and then evaporating the solution thus obtained in shallow dishes. An extensive trade in raw salt thus sprang up, while the refined salt was re-exported, especially to the countries around the Baltic. This trade in salt has powerfully contributed to the extension of The Netherlands shipping and trade, as the ships which carried salt to the Baltic began to bring return cargoes of grain.

Apart from the afore-mentioned production of salt from peat and from sea water, the salt industry in The Netherlands has always been confined to the refining of salt, which however is practised on a large scale and in a technically perfect manner.

In 1913, according to the Treasury returns, there were 34 salt works in The Netherlands, which employed 500 hands.

This industry, which at present derives its raw material more especially from Britain and Germany (about 128,000,000 kilograms of raw salt were imported in 1913), finds its chief market in the country itself, although refined salt is also exported to Germany, Belgium, Denmark, Sweden and Norway.

COCOA AND CHOCOLATE.

Cocoa and chocolate occupy a leading place among the foodstuffs and dainties prepared and manufactured in Holland, where the art of making chocolate from cocoa-nibs was introduced, in 1679, by the writings of Dr. BONTEKOE, physician-in-ordinary to the Great Elector. His book on chocolate, tea and coffee recommended the use of these healthy and, in the case of cocoa, nourishing products.

Chocolate, therefore, was manufactured in The Netherlands, though in a very primitive fashion, as far back as the end of the seventeenth century.

An old cocoa-mill at Weesp.

The process of manufacture consisted almost exclusively in the roasting of the cocoa-nibs, which were ground while still hot, forming a syrupy mass. This was allowed to run into moulds and shaped into tablets or cakes.

The chocolate thus manufactured was bitter in flavour and, since it contained a large proportion of fatty matters, was somewhat difficult of digestion, especially for delicate stomachs. Nevertheless, the products of this manufacture met with success and were long in great request, both in this country and abroad, where they were known by the name of Zeeland chocolate and even enjoyed a certain celebrity.

In 1818, there were 27 chocolate factories in The Netherlands. Most of these so-called factories were in reality no more than cocoa mills working in the manner described above. It was but a slow development that marked the manufacture of chocolate and of the great variety of articles which, while known under different names, are all made of cocoa powder, sugar and spices.

The cocoa industry received a fresh impetus when the problem of the separation of the fatty matters contained in the cocoa, a problem that had long busied the experts, was at last solved.

It was a Netherlander, Mr. C. J. van Houten, of Weesp, the founder of the still existing factory, who, after much experiment and research, succeeded, in 1828, in obtaining a cocoa free from this excess of fat, which rendered it so indigestible, yet retaining all its nutritive value and providing a most agreeable beverage.

Thereupon, side by side with the chocolate industry, was developed the cocoa industry, consisting in the preparation of a pure cocoa powder, with no addition whatever, the aroma of which received its full flavour when the powder was dissolved in boiling water or milk by a simple process of stirring.

The process of removing the fat by mechanical means has been greatly improved since its invention, as a result of the general progress in technical science, and is now employed in all the Netherlands factories. Briefly, the process consists of the following: the cocoa-nibs, after being roasted and peeled, are kept at a temperature of 70° to 80° Centigrade and subjected to hydraulic pressure. This pressure makes the nibs lose a part of their fat (the cocoa butter), which, before the treatment, amounted to about 50°/₀. After the treatment, the product still contains 29 to 32°/₀ of cocoa

Interior of a cocoa factory at Weesp.

butter and 71 to 68$^{\circ}/_{0}$ of other substances (starch, albumen, water, sugar, cellulose, cinders, cocoa pigment and theobromin) and, at the same time, possesses the quality of being now easily soluble in water.

At present, the factories produce cocoa alone, chocolate alone, or both of these articles. Those coming under the last category are in the majority.

The number of these factories has increased in this country by degrees. They are now pretty numerous. There are about 40 of them, employing 3,700 workmen in all. The factories are situated as follows: 10 at Amsterdam, 2 at Alkmaar, 2 at Breda, 1 at Bussum, 1 at Deventer, 3 at The Hague, 2 at Haarlem, 1 at Helmond, 1 at Hilversum, 1 at Koog-on-Zaan, 1 at Nymwegen, 6 at Rotterdam, 1 at Sloten, 2 at Weesp, 1 at Westzaan, 3 at Wormerveer and 2 at Zaandyk.

In addition to these 40, there are some 20 which make products of sugar and chocolate, but these buy the cocoa used in the manufacture of their specialities from the other Netherlands factories, where it has already undergone a short preparation.

Side by side with this industry, The Netherlands drive a not unimportant trade in raw cocoa and also in powdered cocoa and in chocolate in all its forms.

In consequence of the development of the cocoa industry, we have seen a considerable increase, during the nineteenth century, in the quantities of raw cocoa imported. A glance at the figures that follow, taken from the official Netherlands Statistics of Imports, Exports and Transit (*Nederlandsche Statistiek van in-, uit- en doorvoer*), prove this increase very clearly.

Packing of cocoa in a modern factory at Weesp.

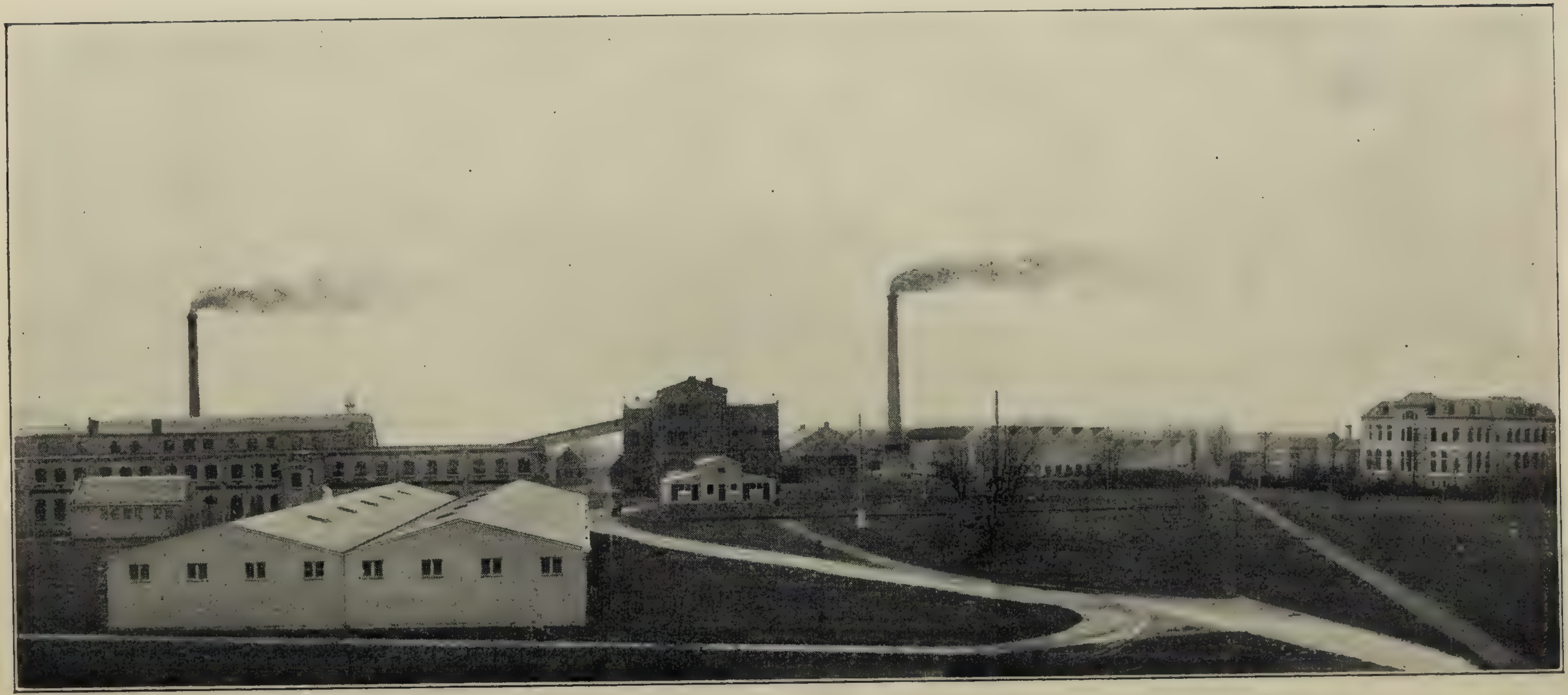
IMPORTS AND EXPORTS OF RAW COCOA FREE FROM SHELL IN THE NETHERLANDS FROM 1847 TO 1913

(In 1,000 kilograms)

Year.	Imports.	Exports.	Balance of Importation.
Yearly average from 1847 to 1856	225	22	203
1857 „ 1866	386	165	221
1867 „ 1876	1,187	653	633
1877 „ 1886	2,282	1,152	1,130
1887 „ 1896	7,483	4,075	3,409
1897 „ 1906	16,252	6,743	9,510
1898	13.900	5,565	8,335
1899	14,309	5,881	8,428
1900	11,815	5,987	5,828
1901	14,363	5,055	9,317
1902	14,666	5,944	8,722
1903	16,742	6,011	10,731
1904	21,126	8,940	12,186
1905	19,295	8,557	10,738
1906	21,231	10,049	11,182
1907	20.789	8,568	12,221
1908	25,226	9,420	15,806
1909	31,063	11,907	19,156
1910	32,301	13,144	19,187
1911	37,774 *	14,238	23,536
1912	38,637	13,715	24,922
1913	43,191	13,211	29,980

* From 1911 the figures do not comprehend the cocoa shells, husks and parings.

The principal markets supplying The Netherlands with cocoa are Hamburg, London, Liverpool, Paris, Hâvre, Bordeaux and Lisbon ; but to a great extent it comes straight from the countries of production (Ecuador, Venezuela, Brazil, Netherlands Guiana or Surinam, Trinidad, the other West Indies and the Netherlands East Indies). The cocoa produced by the island of Java always arrives direct in The Netherlands, through the port of Amsterdam, where it is sold by



Bird's-eye view of a cocoa factory at Weesp.

auction. The other cocoa, too, is imported here mainly through the port of Amsterdam, which possesses more than double the cocoa import recorded for the port of Rotterdam.

Only a part of the production of the Netherlands cocoa factories is consumed in the country itself. A large quantity of powdered cocoa and of chocolate in every form is exported abroad, where these products, thanks to their purity and their superior quality and flavour, rightly enjoy an excellent reputation. For this reason, notwithstanding the fierce competition of the great foreign firms and the impediments caused by import duties, which are often exceedingly high, the exports are constantly on the increase.

Netherlands cocoa is found all over the world. The publicity which it generally receives gives the idea of a cup filled with a delicious and fragrant beverage, which at the same time constitutes a wholesome nourishing food and which is always taken with pleasure. Even in Germany, where new factories are constantly being established and where, moreover, the duty is very high, they nevertheless remain dependent upon The Netherlands for its brands of powdered cocoa and chocolate; and this relates to important quantities.

Chocolate without sugar (cocoa powder) is exported from The Netherlands to every country in the world, but principally to Great Britain, France, the United States of America, Belgium, Denmark, Germany, Russia, Italy, Sweden and the Netherlands East Indies. This is either for local consumption in those countries or for exportation in transit.

Chocolate with sugar is exported principally to Belgium, Great Britain, the United States of America, Turkey and the Netherlands East Indies.

A great trade is also done in cocoa butter, a secondary product of the manufacture, formed by the fat which, as we said above, is expelled from the nibs by hydraulic pressure. It is used in the preparation of chocolate and for pharmaceutical and toilet purposes.

Tea was introduced into Western Europe in 1610 by Netherlands merchants. This tea was imported from Japan; at a later date, it was also brought from China.

Certain well-known Netherlands doctors of the day, including NICOLAAS TULP and CORNELIUS BONTEKOE, had nothing but praise for this new beverage, which enjoyed the public favour for that reason.

The tea trade was almost entirely in the hands of the Netherlands East India Co. ("Oost Indische Compagnie"), which also supplied other European countries. It was, therefore, through the intermediary of The Netherlands that England, France and Russia became acquainted with tea, which was originally known by the name of "hay-water." Tea was first imported into England from this country in 1666.

Fabulous prices were paid at that time; a pound readily fetched fl. 200 to fl. 250 (£ 17 to £ 20). Consequently only very well-to-do people were able to indulge in the luxury of tea drinking. It was not until the importation in larger quantities caused the prices to be lowered that people, especially women, began to meet in order to take tea together, forming clubs for this purpose. The price, notwithstanding this reduction, remained high and left the cost of consumption too expensive for the ladies to take tea outside these gatherings. The prevailing infatuation for tea gave scope to all manner of satires, a specimen of which is still extant in the form of a comedy performed at Amsterdam in 1701 and printed in the same year, entitled, *De theezieke Juffers* ("The Tea-smitten Ladies").

Up to 1707, the price of tea averaged fl. 40 (66*s.*) per pound; it was not until after that year that fresh reductions in the then still exorbitant prices favoured the consumption, which thenceforth made rapid strides.

In 1767, England imported 6,000,000, The Netherlands 4,500,000 pounds of tea.

Until the middle of the nineteenth century, China

View of the Amsterdam tea warehouses.

remained almost the sole purveyor of the European markets; but in 1870 Japan and India began to dispute her place.

The cultivation of tea was introduced into the island of Java in 1826 and was classed among Government cultures. About 1842, private planters in the island began to occupy themselves with this culture, which, until then, had been monopolized by the Government. After the Agrarian Bill of 1870 had passed into law, the number of tea-planting companies in Java increased largely and rapidly. In 1878, Assam tea was transplanted to Java, as supplying a product more suited to the English taste and giving a better yield. At present, the cultivation of this tea has entirely supplanted that of China tea in the island.

The tea is sold mainly at Amsterdam, where some fifteen public sales are held every year. Before the sale, the tea is inspected, tared, weighed and made ready for sale in the buildings of the Tea Warehouse.

Very large quantities of teas imported into this country are again exported, mainly to England, Ireland, Scotland, Germany, Russia, the United States of America, Turkey and the Levantine countries.

Apart from the wholesale trade, The Netherlands carry on a great retail trade in this article with foreign countries, where they deliver large quantities. The tea for this branch is carefully blended to satisfy the taste of the country for which it is intended and is packed with care, according to the needs of the consumer. Naturally, a great number of clerks and workmen find employment in the large firms engaged in this trade in different towns in The Netherlands.

Figures supplied by the "Pakhuismeesteren van de Thee" (Amsterdam Tea Warehouses) show not only that the quantities of tea bought by the trade are gradually increasing, but also that Java tea benefits particularly by this increase. Nevertheless, the consumption of Java tea in The Netherlands has declined somewhat during the last two years. Owing to the very high prices which Java tea was able to command on the general market in 1910 and especially in 1911, the imports of cheap China tea in The Netherlands increased to a certain degree.

Interior view of the Amsterdam tea warehouses.

Coffee was introduced into The Netherlands in the latter half of the seventeenth century: Mocha coffee was first offered on the Amsterdam market in 1663; and, at the beginning of the eighteenth century, supplies also arrived from Malabar. At the instance of the famous burgomaster of Amsterdam, NICOLAAS WITSEN, some coffee trees were transplanted to the island of Java; and, in 1706, the first samples of coffee grown in Java were shown at Amsterdam.

The first Java coffee dispatched for trade purposes was shipped in 1711 on board a vessel sailing for The Netherlands. The cargo consisted of 894 lbs. of coffee from the Jakatra plantations and from the interior of the island.

The Netherlands East India Company contracted with the regents of these countries for the compulsory delivery of coffee, and the natives were enjoined to grow the coffee tree, the production thus becoming a forced industry worked by Government. A "general system of cultivation" was introduced into Java in 1832 by the Government, which decreed the employment of forced labour for different products. As, therefore, coffee-growing was the only one that existed before this system of cultivation, so also it was the only Government cultivation that survived the abolition of the system; as a monopoly, it exists only in a few places in the island of Java, but it has lost its great importance. From 1870 to 1874, the Government plantations yielded an average of 844,854 "picols" a year; from 1875 to 1878, the average was 866,674 picols. Between 1879 and 1883, it rose to 987,682 picols. From 1884 to 1888, the average annual yield was only 629,942 picols; and, since that time, the yield has steadily decreased.

Alongside of these Government undertakings in Netherlands India are the free native cultivations and the plantations worked by private firms, which are far ahead of the Government plantations.

After playing a great part in the eighteenth century, the coffee trade in The Netherlands became still more

Congres in der Brakke Grond
19 Sep 1820

Reproduction of an old print, representing a meeting of coffee brokers at Amsterdam on the 19th of September, 1820.

View of the sample-room at the offices of the Coffee Merchants' Association (Vereeniging voor den Koffiehandel).

important during the height of the Government system of cultivation. The coffee received on the Netherlands market during that period came principally from the forced deliveries and the Government plantations in the Netherlands Indies. Only a small portion was sold in the Indies by the "Nederlandsche Handelmaatschappij" (Netherlands Trading Society), the major portion being sent to the Netherlands markets.

About 40 °/₀ of this coffee was warehoused at Amsterdam, 30 °/₀ at Rotterdam and 30 °/₀ at Dordrecht, Middelburg and Schiedam. The coffee was sold by auction at Amsterdam and Rotterdam. At first, these sales were held twice a year; and the brokers attending them had to purchase supplies for six months. Later, more frequent sales were held, first, every three months and, after 1864, every month. As the number of coffee plantations worked by Government in Netherlands India decreased, the quantity of coffee imported by the "Nederlandsche Handelmaatschappij" also naturally diminished.

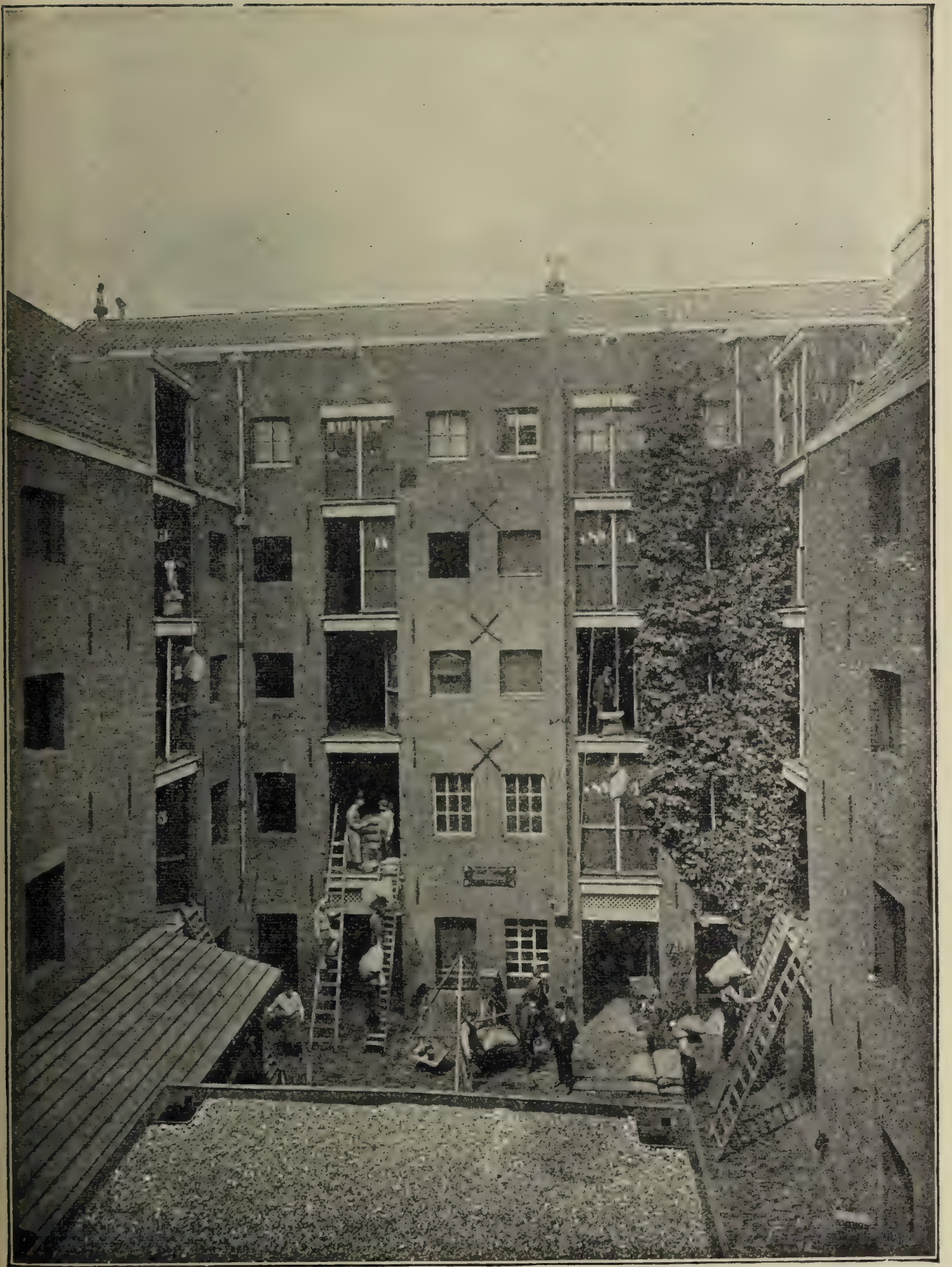
In 1889, it still formed 45.1 °/₀ of the total coffee imports; in 1893, it amounted to only 38.2 °/₀; and it fell to 18 °/₀ in 1898.

On the other hand, the amount exported to The Netherlands, during the same period, by private firms, increased. In 1889, it amounted to 49.5 °/₀ and, in 1898, to 65.7 °/₀ of the total imports.

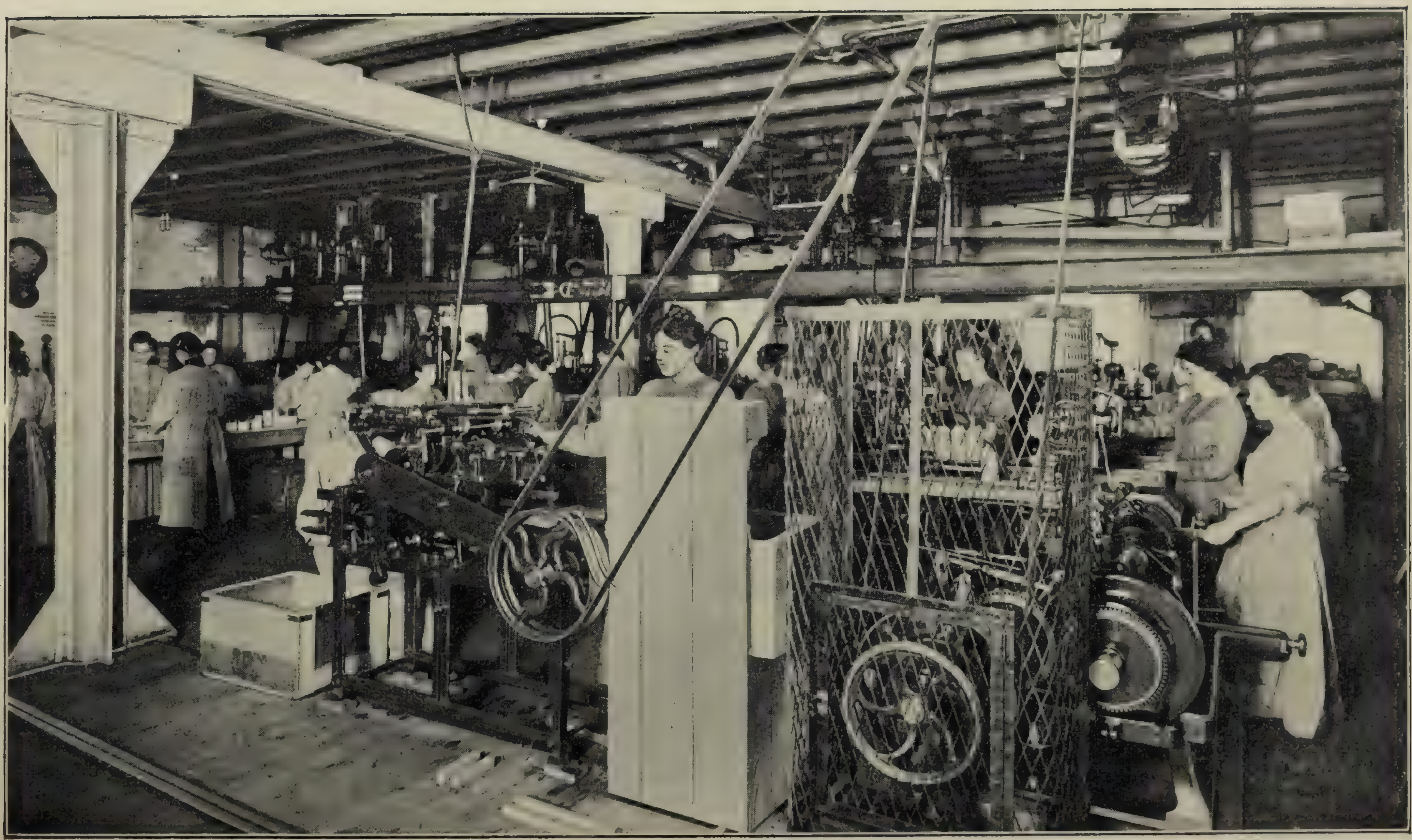
About the same time, Brazilian coffee, more especially Santos coffee, began to take the lead in the Netherlands market. The Santos imports, which, in 1881, amounted to 37,700 bales, had, as early as 1901, risen to 1,200,000 bales, to 1,542,806 bales in 1911, and to about 1,825,000 bales in 1913.

It may be noted that regular sales of Santos coffee imported by the "Nederlandsche Handelmaatschappij" have been held since November, 1909, and have added greatly to the importance of the Netherlands coffee market.

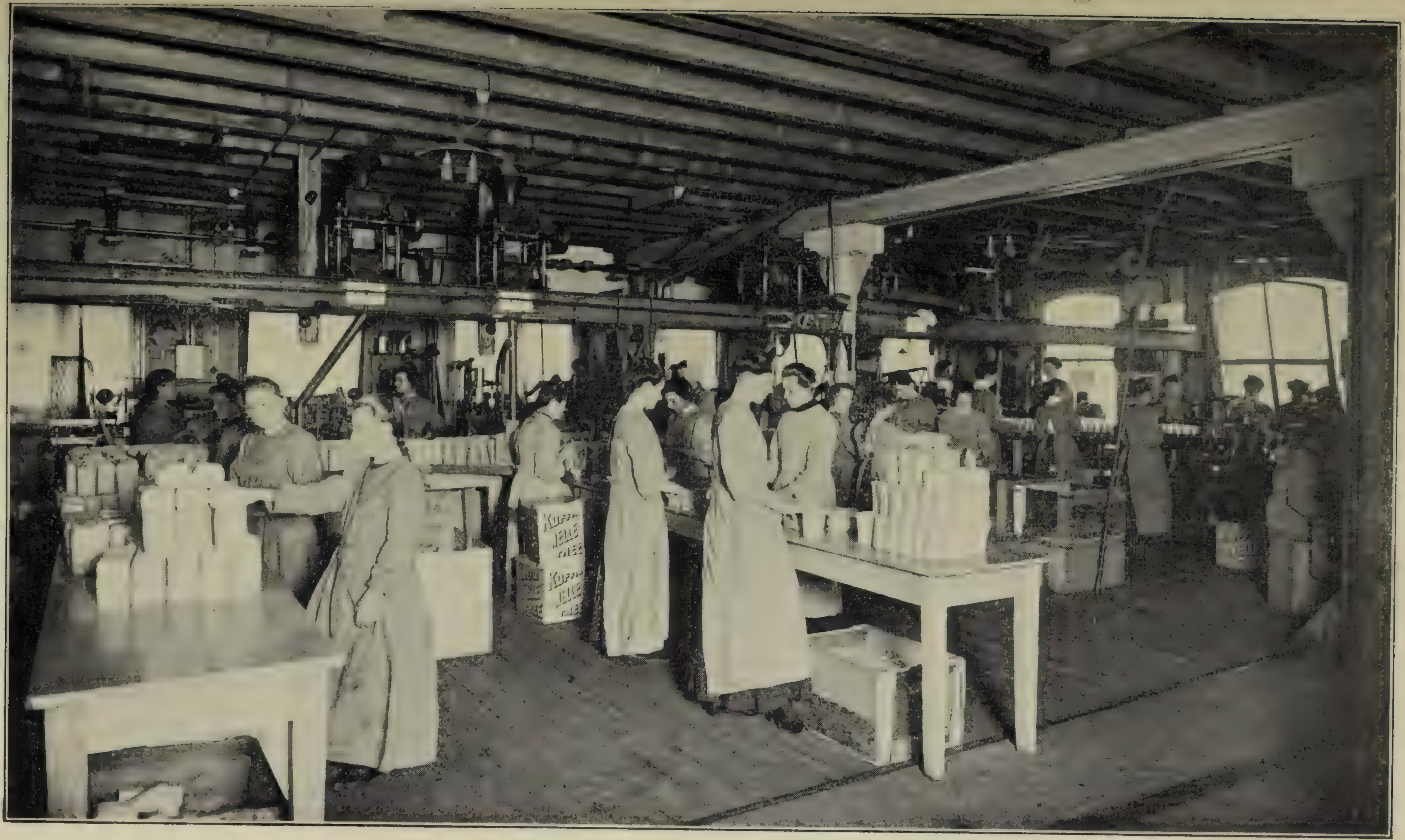
Owing to the importation of Brazilian coffee, the coffee trade has largely developed in The Netherlands, as is shown by the following table, which is taken from the Netherlands Statistics of Imports, Exports and Transit:



The coffee warehouse of the "Nederlandsche Handelmaatschappij" at Rotterdam.



View in a coffee and tea-packer's establishment at Rotterdam.



Another view in a coffee and tea-packer's establishment at Rotterdam.

THE COFFEE TRADE IN THE NETHERLANDS.

(In millions of kilograms).

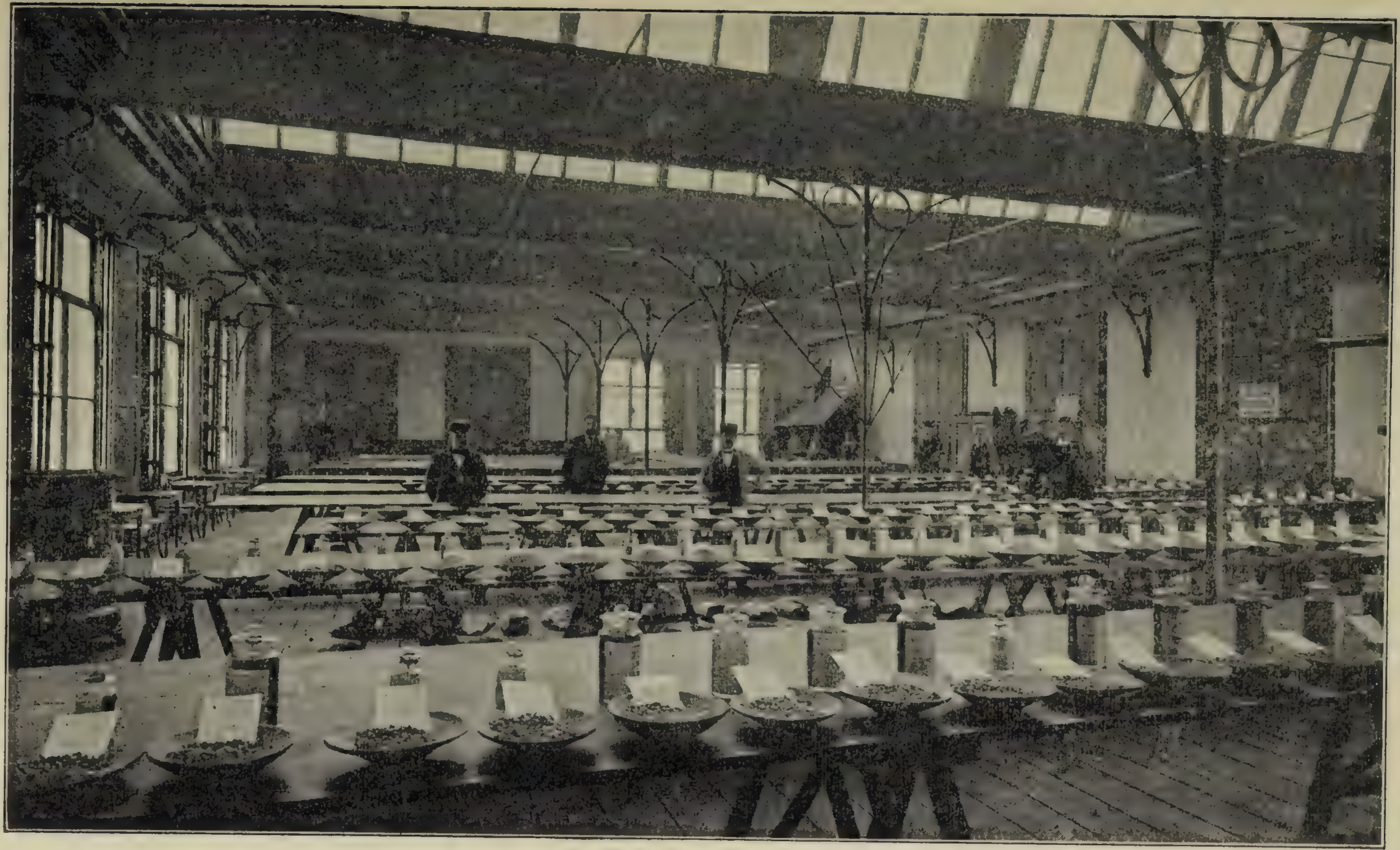
	Years.	Imports.	Exports.	Excess of Imports over Exports.
On the average	1847—1856	56	42	14
	1857—1866	73	62	11
	1867—1876	94	71	22
	1877—1886	101	69	32
	1887—1896	81	53	28
	1897—1906	112	71	41
	1906	116	73	43
	1907	118	80	38
	1908	119	82	37
	1909	131	87	44
	1910	120	78	42
	1911	131	88	43
	1912	116	82	34
	1913	145	92	53

Since the decline in the importation of Java coffee and the increase in that of Santos coffee, merchants have begun to deal in coffee for account. To facilitate this system, clearing-houses have been established in Rotterdam and Amsterdam, which guarantee all buying and selling transactions for account, on guarantee deposits.

The statistics of the imports and exports of coffee show that the imports have more than doubled since the year 1847.

The exports, which amounted to 92 million kilograms in 1913, have not progressed in the same proportion, whence it follows that the quantity available for home consumption has steadily increased, a very natural result of the increase in the population and of the amount consumed per head.

As coffee-drinkers, the people of The Netherlands stand in front of every other country, consuming 6.58 kilograms annually per head of the population. Belgium comes next, with 5.95 kilograms per head; Sweden, with 5.4 kilograms



Roasting and exhibition of coffee samples, prepared for auction.

per head; the United States, with 4.98 kilograms per head; and Germany, with 3.17 kilograms per head. The other countries all consume less than the last-named quantity.

The increase in the consumption has, in its turn, brought about a development in the coffee industry, that is to say, in wholesale coffee-roasting.

The roasting, which in former days was done in small quantities and in a very unsatisfactory manner by thousands of persons throughout the country, has now become a very large business, the principal centres of which are Rotterdam, Amsterdam, Bois-le-Duc, Leyden, Utrecht, Maastricht, &c. The machinery used for the roasting is constructed in accordance with the latest inventions.

The largest roasting houses are at Rotterdam, where about $7^1/_2$ million kilograms of coffee are roasted yearly, and at Amsterdam, where about $2^1/_2$ millions are roasted.

The Netherlands are justly entitled to pride themselves on being able to drink the best coffee at a very cheap price, in comparison with those countries where coffee pays heavy import duties or where, through defective treatment, it is not up to the standard demanded by the customer.

CHICORY AND "PEEKOFFIE".

Chicory and "peekoffie" (beet-coffee) are made of chicory root. The two products are used to strengthen the flavour of coffee. Mixed with the coffee, they give it a more agreeable flavour and a fine dark-brown colour.

Chicory is sold in a slightly moist form, "peekoffie" quite dry, in entirely different packings. The former of these articles is used mostly in the northern provinces, the latter mainly in the southern provinces.

Chicory is grown in The Netherlands principally in Friesland and Groningen and on the islands of Schouwen and Flakkee. It is an autumnal plant. The root is cut up and dried and, especially in the dry state, occupies an important place as an article of commerce and speculation. The drying is done in special establishments by means of kilns. The owners of these establishments buy the roots from the growers and sell them, after the drying, to the manufacturers. The manufacture of chicory and "peekoffie" does not require a large staff of workmen: the roasting and very often the packing being performed, of late years, by machinery.

The total number of these factories amounts to over 35, employing about 250 workmen. Most of them, therefore, are small concerns. Their production may be estimated at 3 to 4 million kilograms. The article is exported to Belgium, Norway and the United States of America.

SPICES.

The Netherlands trade in spices, the aromatic vegetable products of the tropics, largely used as condiments, flourished in the 17th and 18th centuries and is still of importance. From olden times the Moluccas were the principal source of supply, but nowadays spices are also produced on a large scale by other islands of the East Indian Archipelago and other tropical countries.

The principal kinds of spices are cinnamon, cloves, nutmeg and mace, pepper and vanilla.

Cinnamon is the dried bark of different trees and shrubs of which the Ceylon cinnamon (Cinnamomum zeylanicum) is the most valuable, but is not cultivated to a large extent in the Netherlands East Indies. Of more importance is the cultivation of Cinnamomum cassia (cassia lignea) and Cinnamomum Burmanni (cassia vera).

The different kinds of cinnamon are not only used as condiments, but also for the manufacture of volatile oils.

The following statement shows the imports and exports of cinnamon, cassia lignea and cassia vera in The Netherlands:

(In Guilders).

YEARS (on the average)	Imports.	Exports.
1846—1855	639,787	548,627
1856—1865	536,782	556,208
1866—1875	97,383	25,641
1876—1885	76,496	62,521
1886—1895	48,554	54,027
1896—1905	91,180	107,396
1906—1910	100,814	241,241
1911	114,253	117,541
1912	137,516	186,604
1913	140,816	149,312

Cloves, the dried unexpanded flowerbuds of the clove tree (Caryophyllus aromaticus or Eugenia caryophyllata), are used as condiments and for the manufacture of volatile oils for industrial purposes.

Although the Zanzibar cloves, in consequence of their large production, command the market, the product of the Moluccas (known as Amboina cloves) fetches a far higher price by reason of its superior quality.

The turn-over in Zanzibar cloves in the Amsterdam and Rotterdam markets is liable to great fluctuations on account of the variability of the crops.

We append a statement of the imports and exports of cloves in The Netherlands:

(In Guilders).

YEARS (on the average)	Imports.	Exports.
1846—1855	170,140	80,696
1856—1865	62,883	77,582
1866—1875	11,999	28,560
1876—1885	31,982	10,949
1886—1895	33,320	1,754
1896—1905	44,902	32,729
1906—1910	52,328	15,704
1911	52,471	14,645
1912	51,510	25,740
1913	75,983	3,992

Exhibiton of spice samples prepared for auction.

Nutmeg and mace. Although these spices are totally different in respect to outward appearance and composition, they may be treated here together, because they are obtained from the same plant, namely the nutmeg tree (Myristica fragrans), indigenous to the Moluccas.

Both nutmeg and mace derive their value as condiments from the volatile oils which they contain.

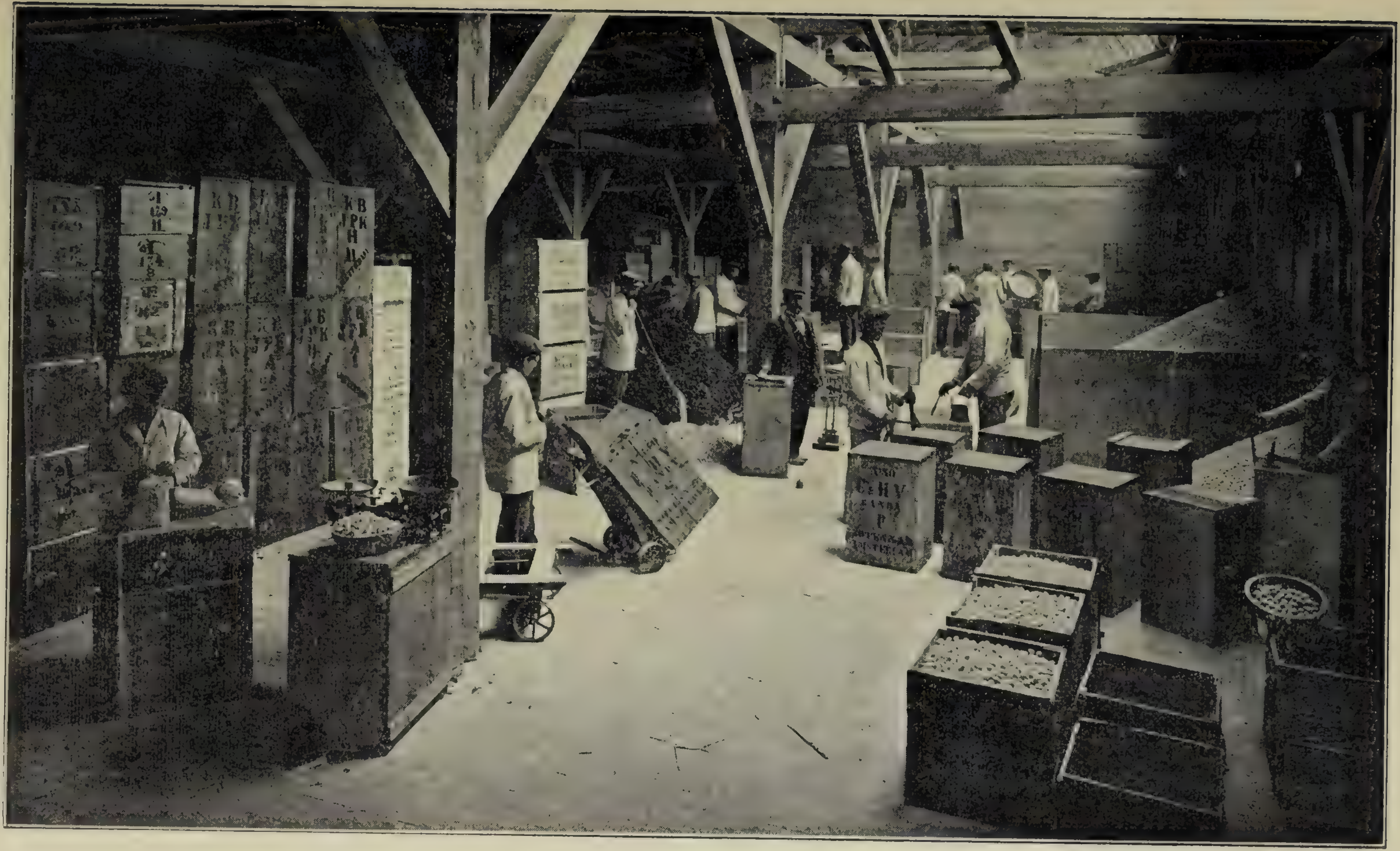
The following table shows the imports and exports of nutmeg and mace in The Netherlands:

(In Guilders).

YEAR (on the average)	Imports.		Exports.	
	Nutmeg.	Mace.	Nutmeg.	Mace
1846—1855	865,768	278,427	701,013	187,370
1856—1865	567,358	172,803	476,082	158,104
1866—1875	52,897	17,414	120,845	24,588
1876—1885	123,246	13,720	23,474	7,699
1886—1895	154,999	19,440	14,319	7,787
1896—1905	174,581	19,431	24,036	9,098
1906—1910	146,030	19,015	36,427	5,048
1911	103,168	26,136	79,740	5,565
1912	85,089	29,853	94,464	5,415
1913	116,624	32,983	26,820	6,180

Pepper is one of the most largely used condiments. The principal kinds are white and black pepper, both obtained from the same plant (Piper nigrum), which is cultivated in India, Sumatra, Malacca, Java, some other islands of the Indian Archipelago and in Siam. Of less importance for the Netherlands trade are cubebe (Piper cubeba), Cayenne pepper (capsicum annuum and Capsicum longum), pimento (Pimenta officinalis) and melegueta pepper (Amomum melegueta).

We append the figures from the Netherlands statistics of Imports and Exports (special trade):



Spice floor in the Municipal Commercial Bonded Warehouse Establishment at Amsterdam.

(In Guilders).

YEAR (on the average).	Imports.		Exports.	
	Pepper and Pepperdust.	Pimento.	Pepper and Pepperdust	Pimento.
1846—1855	143,464	14,467	108,398	5,400
1856—1865	169,146	23,591	114,490	4,669
1866—1875	60,899	15,599	11,212	1,863
1876—1885	76,174	21,706	10,010	1,331
1886—1895	95,066	19,354	5,168	636
1896—1905	75,589	29,902	6,533	1,937
1906—1910	98,282	19,592	5,275	2,931
1911	56,886	24,673	8,740	1,359
1912	144,005	28,379	31,183	4,486
1913	102,914	34,300	5,663	1,430

Vanilla is the dried pod or fruit of the *Vanilla planifolia,* which is indigenous to Mexico, but is also cultivated in Reunion (Bourbon), Mauritius, Java, the Seychelles, Madagascar, etc. The aromatic constituent of this product is called vanilline.

The Netherlands market regularly receives small lots of vanilla, principally from the Netherlands East Indies. Java vanilla contains as much vanilline as the best kinds of Bourbon vanilla.

The following statement shows the Imports and Exports of vanilla in The Netherlands:

(In Guilders).

YEARS (on the average).	Imports.	Exports
1846—1855	10,142	2,053
1856—1865	69,549	12,975
1866—1875	17,713	26,037
1876—1885	32,713	16,261
1886—1895	42,978	25,725
1896—1905	70,265	15,967
1906—1910	68,164	20,734
1911	90,031	49,280
1912	96,185	438
1913	68,786	26,320

Although The Netherlands are among the foremost European countries that supply dairy produce, owing to the excellence of their native butter, the margarine trade of the country developed rapidly even before other countries had thought of working it.

In 1871 and consequently two years after the Frenchman Mège Mouriès' invention, a Netherlands firm purchased his secret for the manufacture of margarine and set up the first artificial butter factory in this country (at Oss, in North Brabant).

The process, however, soon became public property, and a good many margarine factories sprang up all over The Netherlands, but principally in the cattle-rearing districts, where daily purchases of large quantities of milk are more easily effected.

To-day, there are 28 margarine factories in The Netherlands, employing about 2,400 hands, including 4 at Rotterdam, with about 615 hands. Several Netherlands firms work margarine factories abroad as well, at such places as Antwerp, Brussels, Goch, Hamburg and Cleves.

To avoid confusion between margarine and butter a special law has been enacted and the well-known Government Mark of Guarantee for butter has a satisfactory effect.

The great development of the margarine trade in this country has given rise to an extensive trade not only in that product, but also in the materials used in its production.

The trade in raw margarine and in *neutral pig fat* (lard) is centred at Rotterdam, most of the artifical butter factories being in the south of the country.

It is evident from the following figures that, since 1847, the importation of articles classified in the official returns under the head of fat, talc, tallow, lard and raw margarine (oleo-margarine) has increased enormously:

Interior of a margarine-factory at Rotterdam.

IMPORTS AND EXPORTS (SPECIAL TRADE) OF FATS

(in thousands of kilograms).

YEARS.	Imports.	Exports.	Excess of Imports over Exports.
1847—1856	1,738	126	1,612
1857—1866	3,064	1,060	2,004
1867—1876	14,396	4,936	9,460
1877—1886	46,408	8,294	38,115
1887—1896	87,612	31,476	56,136
1897—1906	120,802	57 266	63,536
1906	142,968	67,766	75,202
1907	127,303	71,486	55,817
1908	120,908	71,526	48,382
1909	117,230	65,158	52,072
1910	110,187	61,029	44,810
1911	137,022	76,439	60,383
1912	160,000	89,000	71,000
1913	152,000	82,000	70,000

The Netherlands Statistics of Imports, Exports and Transit give the following figures for raw margarine:

YEAR.	IMPORTS (Special Trade).	EXPORTS (Special Trade).
1901	49,061,194 kilograms	21,537,838 kilograms
1902	37,836,557 »	17,592,561 »
1903	47,699,686 »	24,064,096 »
1904	46,843,903 »	25,148,850 »
1905	52,046,801 »	23,096,856 »
1906	55,629,641 »	26,732,391 »
1907	41,655,481 »	24,517,804 »
1908	32,657,883 »	22,967,604 »
1909	28,293,670 »	21,308,208 »
1910	23,666,437 »	19,318,238 »
1911	49,319,000 »	26,625,000 »
1912	41,954,000 »	26,794,000 »
1913	42,959,000 »	21,986,000 »

Raw margarine comes principally from the United States. Lard comes exclusively from the United States and arrives partly by way of England or Belgium.

Side by side with these products, cotton-seed, groundnuts, sesame and coconut oils are used in The Netherlands margarine trade in ever-increasing quantities. Nowadays, a very pure and sweet butter is manufactured from copra and may become a very important product of the margarine industry.

Table margarine has of late years become an important article of export, of which Great Britain is the principal foreign market. Other importing countries are Denmark, Iceland, Egypt, Turkey, the Netherlands Indies, China and Japan.

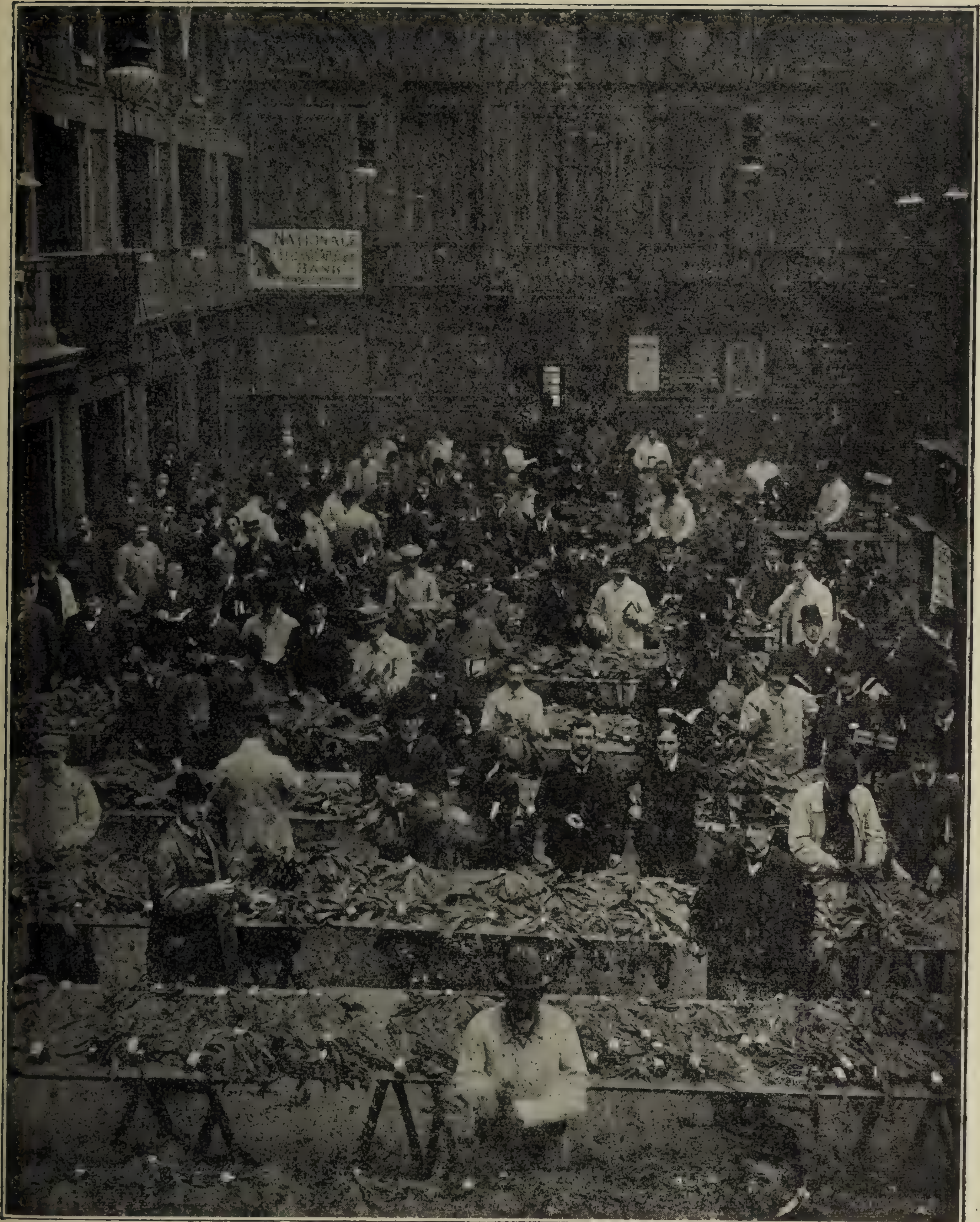
The consumption of margarine, especially of the best qualities, which approximate most closely to natural butter, is increasing at home as well as abroad. Owing to the growth of vegetarianism, several kinds of vegetable butter made with coconut fat (copra) and other vegetable fats find a growing market in The Netherlands. Up to now, these imitations of butter constitute only an article of import. Nevertheless, the starting of factories is under consideration.

THE TOBACCO AND CIGAR TRADE AND MANUFACTURE.

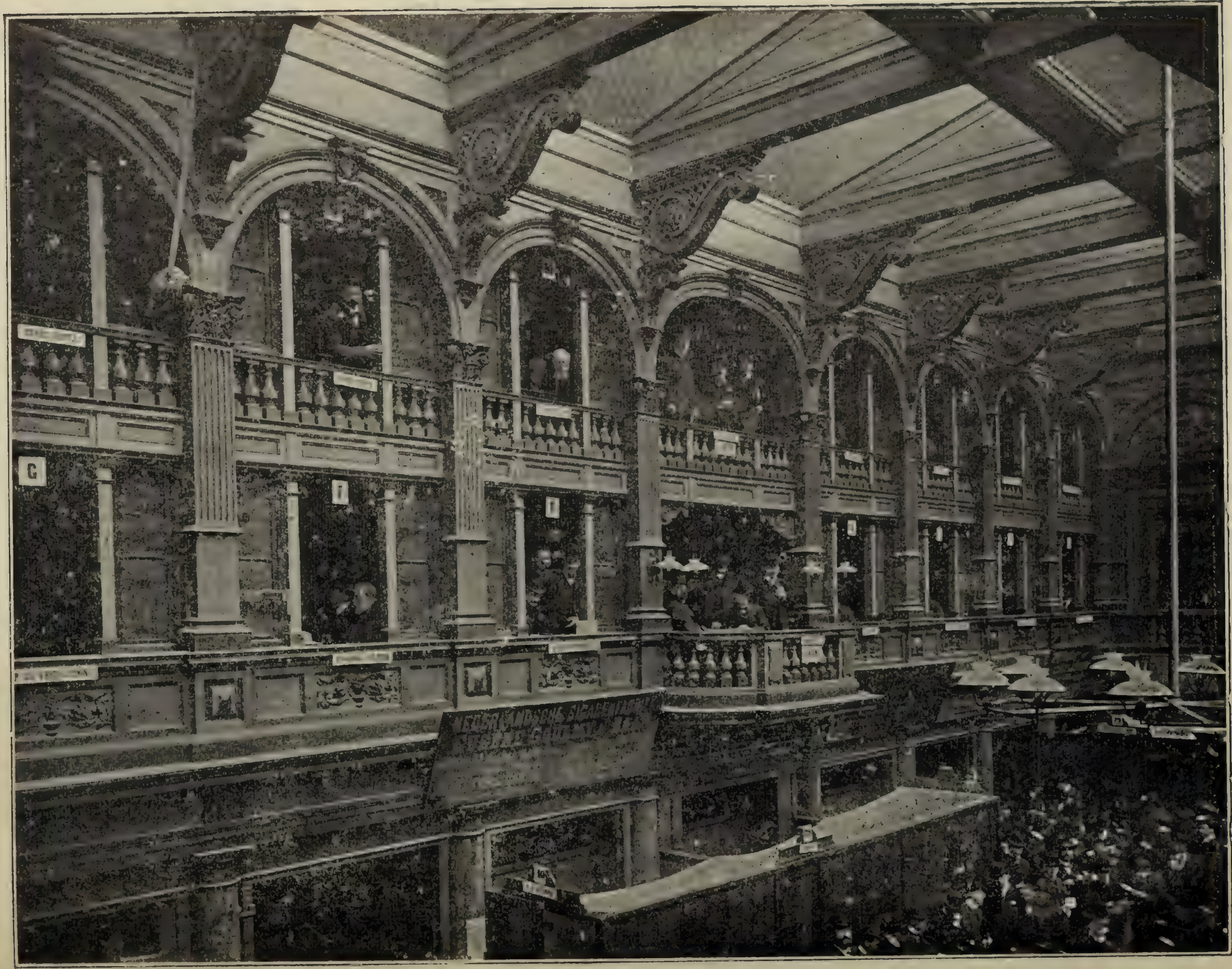
The part played by The Netherlands in the tobacco trade of the world has always been very great.

As early as the middle of the seventeenth century, the tobacco trade enjoyed a real importance in this country. Numbers of richly laden ships entered the harbours and filled the floors of the warehouses of Amsterdam, Rotterdam and Dordrecht with several thousand kilograms of tobacco.

This prosperity of the tobacco trade reached its culminating point at the beginning of the eighteenth century. At that time, the tobaccos imported into The Netherlands were mainly those of Maryland, Virginia and Kentucky, but also included Varinas, which arrived ready prepared and plaited in baskets known as canasters and of which Amsterdam held



Merchants and Brokers valuing samples of tobacco to be sold by tender on the general show-day at Amsterdam.



The Frascati sale-room at Amsterdam during the tendering for tobacco, with the merchants in their boxes.

the monopoly from 1750 to 1755. There were also tobaccos from Jamaica, St. Vincent, Dominica, Havana, Porto Rico and Brazil.

The Netherlands market was therefore always amply supplied with the best tobaccos; and the native and foreign merchants preferred to send their orders to Amsterdam or Rotterdam, or else came personally to make their purchases.

Until about 1840, the greater part of the tobacco intended for the markets of the world was supplied by America. This altered when the Netherlands East Indies began to produce same, for then the tobaccos of Java, and after 1870 also those of Sumatra, soon dominated the Netherlands market. And they have retained this position since, nothwithstanding the competition of Bremen and Hamburg, for buyers find facilities in this country which are offered to them nowhere else, thanks principally to the import duties, which are so trifling that they leave tobacco (on entering) almost free of all formalities. Dealings in this article can therefore be effected more quickly and more cheaply in The Netherlands than in any other country.

The majority of the tobaccos imported come from Sumatra and Java. Minor quantities arrive from British Borneo, although this country sends the whole of its produce (which comes from plantations worked by foreign companies) to be sold on the Netherlands markets.

Of late years, Netherlands Borneo has ceased to produce tobacco for the European market.

The following table gives a view of the increase in these three sorts of tobacco from 1864 to our own time:

ARRIVALS OF TOBACCOS FROM THE NETHERLANDS EAST INDIES IN THE MOTHER COUNTRY.

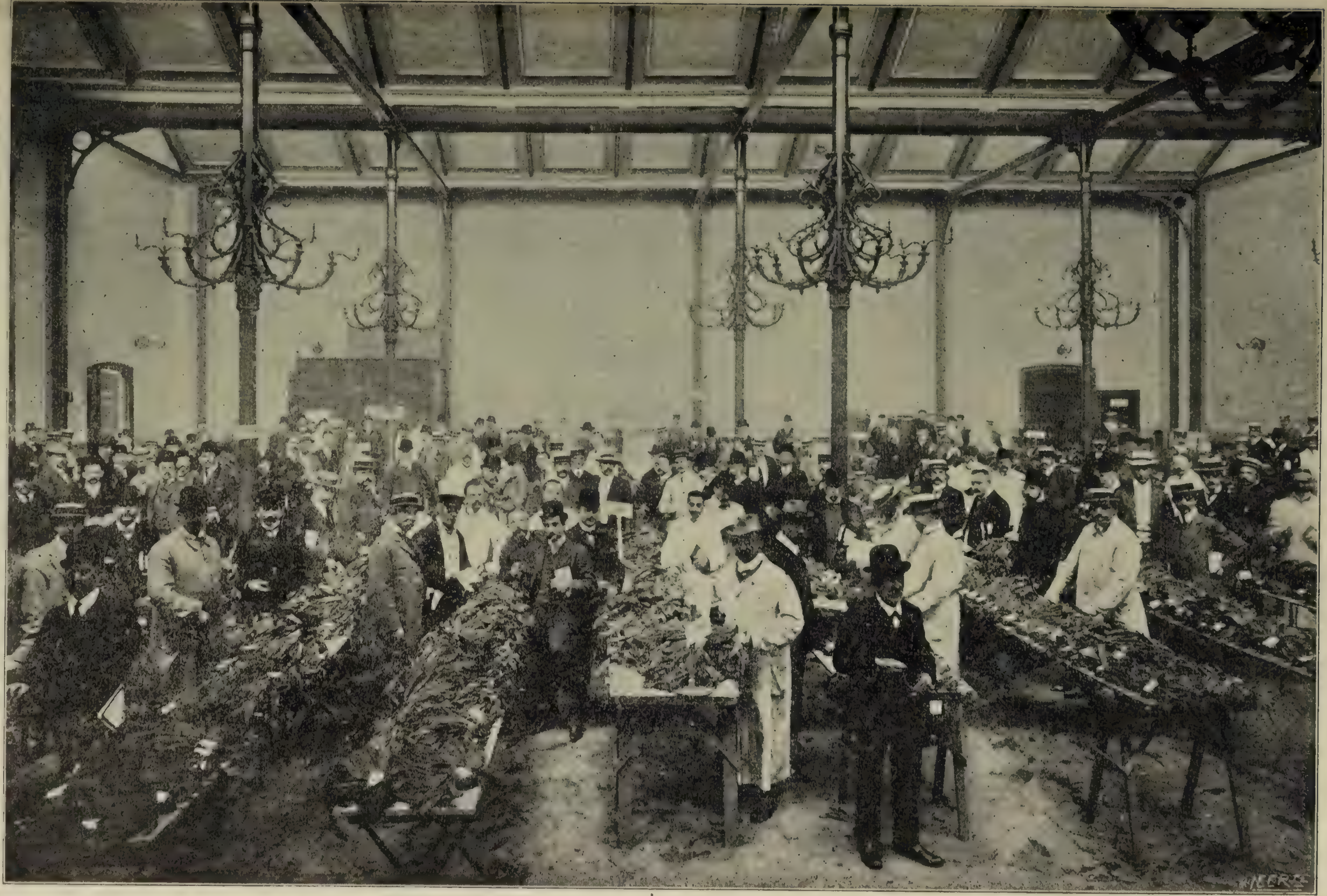
Crop	SUMATRA		JAVA		Crop	BORNEO	
	Bales	Value in thousands of guilders *	Bales	Value in thousands of guilders		Bales	Value in thousands of guilders
1864	50	4	90,000	—	—	—	—
1871	3,922	750	129,070	15,456	1886	27	5
1880	64,965	11,251	149,630	10,067	1890	9,327	956
1890	219,044	24,510	182,406	8,000	1895	13,369	1,981
1900	223,731	38,000	241,536	13,000	1900	18,115	2,250
1901	227,512	32,550	307,326	13 500	1901	17,065	2,250
1902	242,132	31,200	336.500	12,250	1902	14.865	1,500
1903	254,602	35,900	339.717	17,500	1903	17,364	2,000
1904	233.957	35,800	328,243	16,500	1904	16,615	1,500
1905	225,269	54,500	432,359	22,200	1905	17.062	2,500
1906	248,441	61,600	515,610	26,800	1906	16.212	2,390
1907	272,463	38,700	617,249	32,400	1907	18,220	2,085
1908	271,358	46,600	505,900	26,850	1908	15,121	1,800
1909	273,725	34,500	303,733	20,225	1909	14,586	2,250
1910	234,132	47,850	459,209	29,600	1910	14,844	3,057
1911	280,704	60,631	707,742	38,218	1911	15,231	2,083
1912	282,920	58,560	693,279	30,885	1912	18,609	2,158

* The guilder is equal to 1*s.* 8*d.*

The three sorts together therefore represented in 1913 (for the 1912 crop) an aggregate value of fl. 91,600,000 or about £ 7,600,000.

Apart from Netherlands East Indian and American tobacco, The Netherlands also import, although in smaller quantities, tobaccos from other countries, such as Algeria, Germany, Hungary, Russia, the Philippine Islands, British India, China, Greece and Turkey.

Tobacco, therefore, may be called the most important warehousing article of Netherlands commerce; and the current prices of the tobacco market form a factor of social economy which is of the greatest interest to a large number of persons.



Valuing samples of tobacco before the sale by tender at Rotterdam.

Tobacco is a product of great importance to The Netherlands, not only as an article of commerce, but also as the raw material requisite to different industries.

A very extensive and prosperous industry is engaged in this country in the manufacture of smoking and chewing tobacco and of cigars and cigarettes.

The manufacture of cigars in particular has become so important a branch of industry that at present it finds occupation for tens of thousands of workmen. It is scattered all over the country, although it is more extensive in certain towns and districts than in others. We find it more particularly developed in the so-called "Meiery," or Bailiwick of Bois-le-Duc (Eindhoven, Bois-le-Duc and environs), where it has been fixed since the early part of the nineteenth century, and at Culemborg, Delft, Kampen, Utrecht, Amsterdam, Rotterdam, Wageningen, Rhenen, Groningen, etc. There are more than 180 cigar factories, large and small, in the province of North Brabant alone.

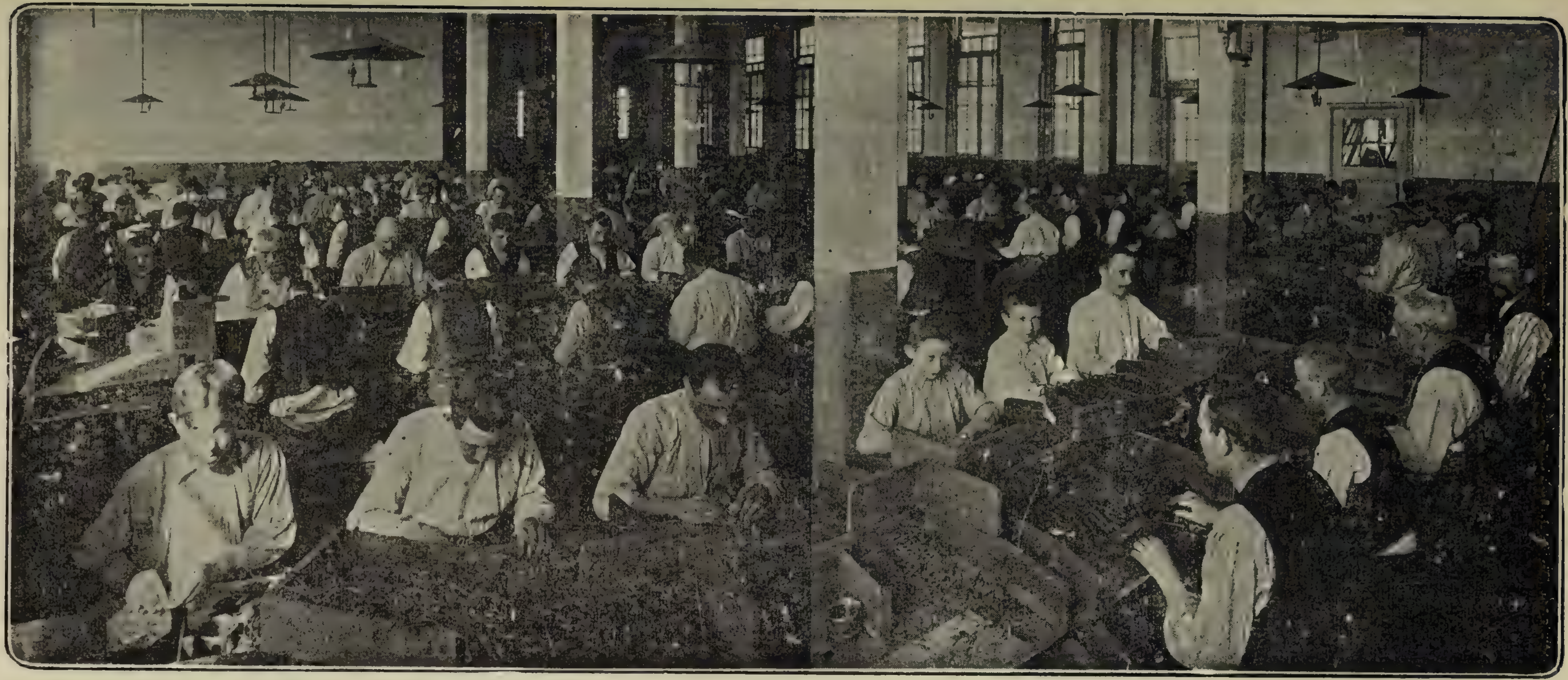
The Netherlands cigar manufacturers employ for the outer leaf the finest tobaccos that burn well and please the sense of smell by spreading a delicate aroma; that is to say, they select by preference, for this purpose, Sumatra and Java tobacco, using, of the latter, mainly the excellent "Vorstenlanden" tobacco. Borneo tobaccos and Seedleaf come second.

Sumatra, Java and Seedleaf are also often used for the wrapper; and Hungarian tobacco for cigars of inferior quality.

The filling often consists of Java tobacco for the lower brands of cigars. As the class of cigar improves, the makers add Brazilian tobacco, of which the filling of a good cigar is composed for the greater part. For cigars superior to these, Havana tobacco is used, either in addition to Brazilian or Java, or exclusively. Cigars of good quality are rolled by hand; others are made by machinery.

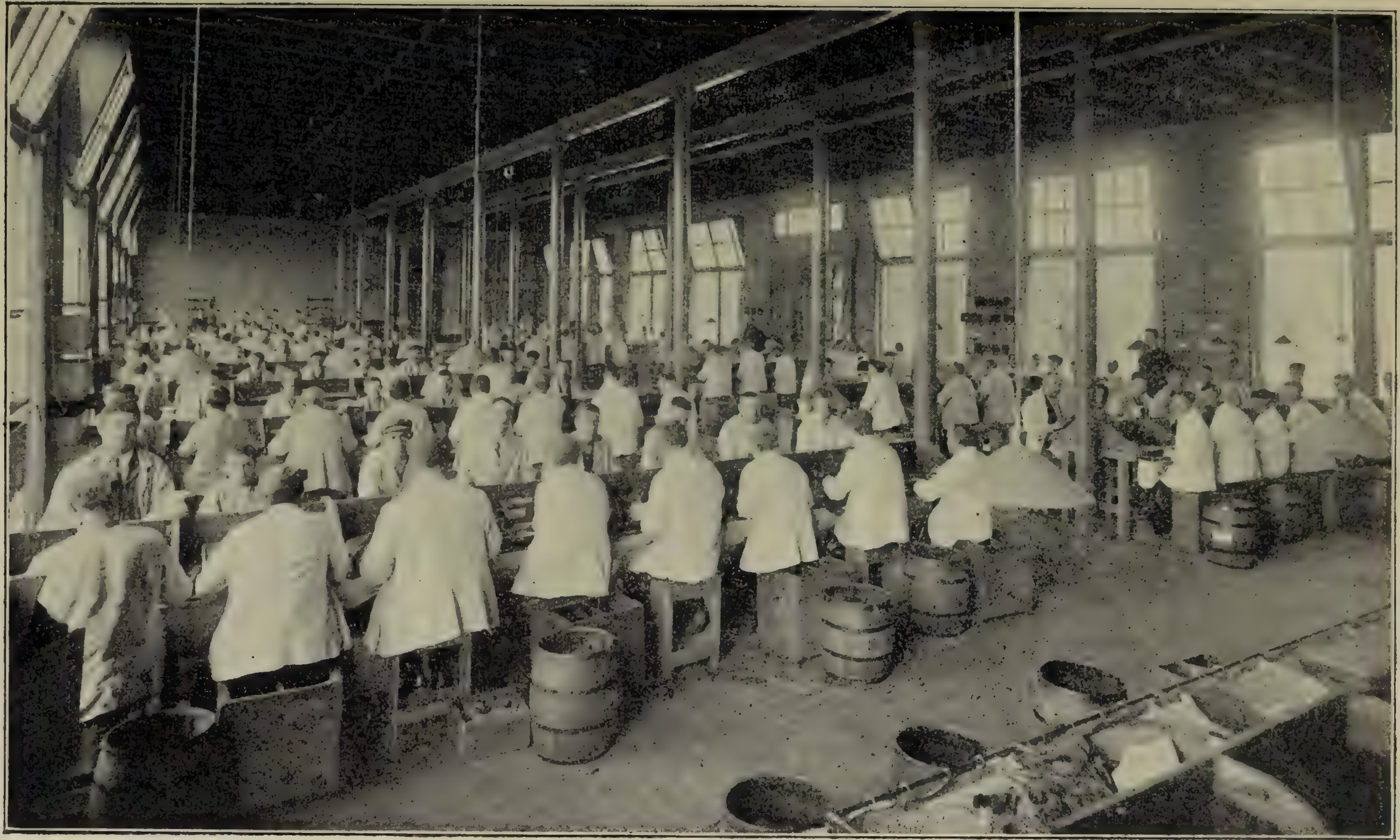
The manufacture of cigarettes also forms an important branch of the tobacco industry. There are 8 cigarette factories, of which 4 are at Amsterdam, 1 at Oosterhout, 2 at Rotterdam and 1 at Roosendaal.

The number of factories for cutting or chopping tobacco



A cigar-maker's workshop in a cigar factory at Bois-le-Duc.

A cigar factory at Bois-le-Duc.



View in a cigar factory at Delft.

has been greatly reduced since the middle of the nineteenth century On the other hand, among the 200 (and more) which still exist and which employ about 3,200 workmen, there are some of genuine importance, whose machinery, worked by steam, is able to turn out large quantities

The very important home consumption of the products of the national tobacco industry does not prevent the manufacturers from also exporting their products on a large scale.

Tobacco prepared for consumption is exported mainly to the Netherlands East Indies, Belgium, the Coast of Africa and Denmark. The cigars are sold in every country in the world (except in cases where a Government monopoly or a prohibitive duty renders the importation impossible), for cigars of Netherlands manufacture, owing to their manifold qualities, enjoy an excellent reputation everywhere.

The largest quantities exported of late years have gone to the Netherlands East Indies, Germany, Belgium, Denmark and Great Britain.

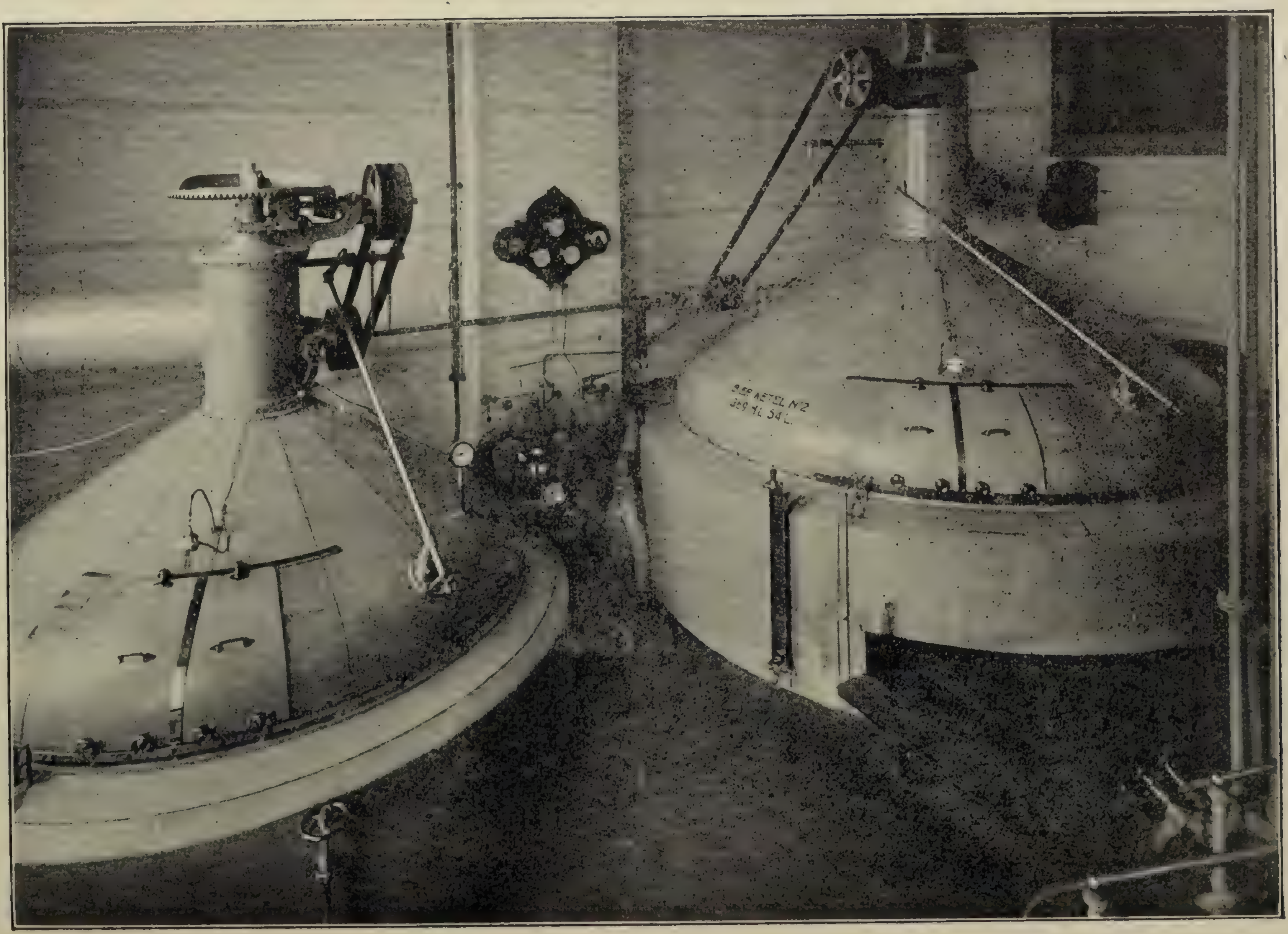
BEERS.

Beer has been the popular beverage of The Netherlands since the most remote times. As early as the middle ages, different towns and districts were known for their breweries. By the fifteenth and sixteenth centuries, this industry had become a national industry, working for foreign countries as well as for home consumption.

In the eighteenth century, however, and the first half of the nineteenth, the number of breweries decreased considerably, as coffee and tea were beginning to take the place of beer as the popular beverage, while gin was becoming a serious competitor.

The actual number of breweries was diminishing in the centre and in the north of the country, where, under the influence of the great technical progress achieved, the tendency was to concentrate this industry more and more in larger and more modern undertakings. On the other hand, in the past fifty years the number has increased by about 40 in the province of Limburg. Limburg, with about 300,000

View of a brewery at The Hague.



Partial view of the boilers in a brewery at The Hague.

inhabitants, contains at present 180 breweries; North Brabant, with 600,000 inhabitants, contains about the same number; and the village breweries of Limburg are neither smaller nor less important than those of North Brabant.

Still, they are not to be compared for a moment with the great breweries of North and South Holland. The largest are to be found at Amsterdam (6), Rotterdam (2), The Hague and Maastricht, the four towns which enjoy the largest output. Amersfoort, Arnhem, Breda, Hengelo and Leyden also possess breweries of considerable importance. In all, the breweries find work for about 3,000 hands. Six of them employ over 100 workmen apiece. Some have their own malthouses. Others receive large quantities of barley malt and grits (prepared Indian corn) from abroad, but they also employ a good deal of rice. In North Brabant there are a certain number of malt-houses which are not attached to other industries and which also export their malt to Belgium.

Most of the breweries make more ice than they require for their own use and dispose of the surplus to tradesmen and private customers. There are also, at some places, factories for the production of ice only, among others at Ymuiden, an important fishing port.

In consequence of the improvement in the quality of the beers, the consumption of beer has increased, to the detriment of that of wine and spirits. This fact has benefited the home trade; but the export also has undergone a large development. It has increased almost five-fold since 1870. In 1913, the export (special trade) amounted to 9,148,000 litres, the greater part of which was exported to the Netherlands Indies, France, Great Britain (lager beer), Belgium and Spain. The Netherlands Indies buy a large quantity of pasteurized beer, both bottled and in the barrel.

SPIRITS AND YEAST.

In the Netherlands industry engaged in the manufacture of spirits, we have to distinguish between the boileries producing *malt wine*, the factories producing *rectified alcohol*, the distilleries producing *gin* and those producing

The establishments of the Calvé-Delft Oil Manufactories and of the Netherlands Yeast and Spirit Manufactory at Delft.

liqueurs. The production of gin and liqueurs is often combined in the same factories.

In the production of both maltwine and rectified alcohol (at least when the last-named is made from grain) *yeast* also is obtained, while as a residue of this process the so-called *spoeling* (swillings) is obtained, which is very largely used for feeding cattle and has contributed in a large measure to the development of the stock of cattle in the neighbourhood of Schiedam, the town where the greatest number of maltwine boileries are established.

Interior of an old-fashioned distillery.

The production of gin is an old and special Netherlands industry. It is now manufactured either from maltwine or rectified alcohol, originally only from the first-named of these. This maltwine is produced chiefly from grain, mostly under the action of barley malt (diastase), and it is to its very important grain trade, joined to its favourable position for shipping, that the town of Schiedam owes the birth and development of the maltwine industry.

In the course of the nineteenth century, the number of boileries in The Netherlands diminished, but, at the same time (even as in the case of the breweries), the small boileries gradually made way for larger establishments, with the result that there was no decrease in the production. In 1885 there were still 439 boileries left in The Netherlands; but, from that time forward, the number began to decrease considerably.

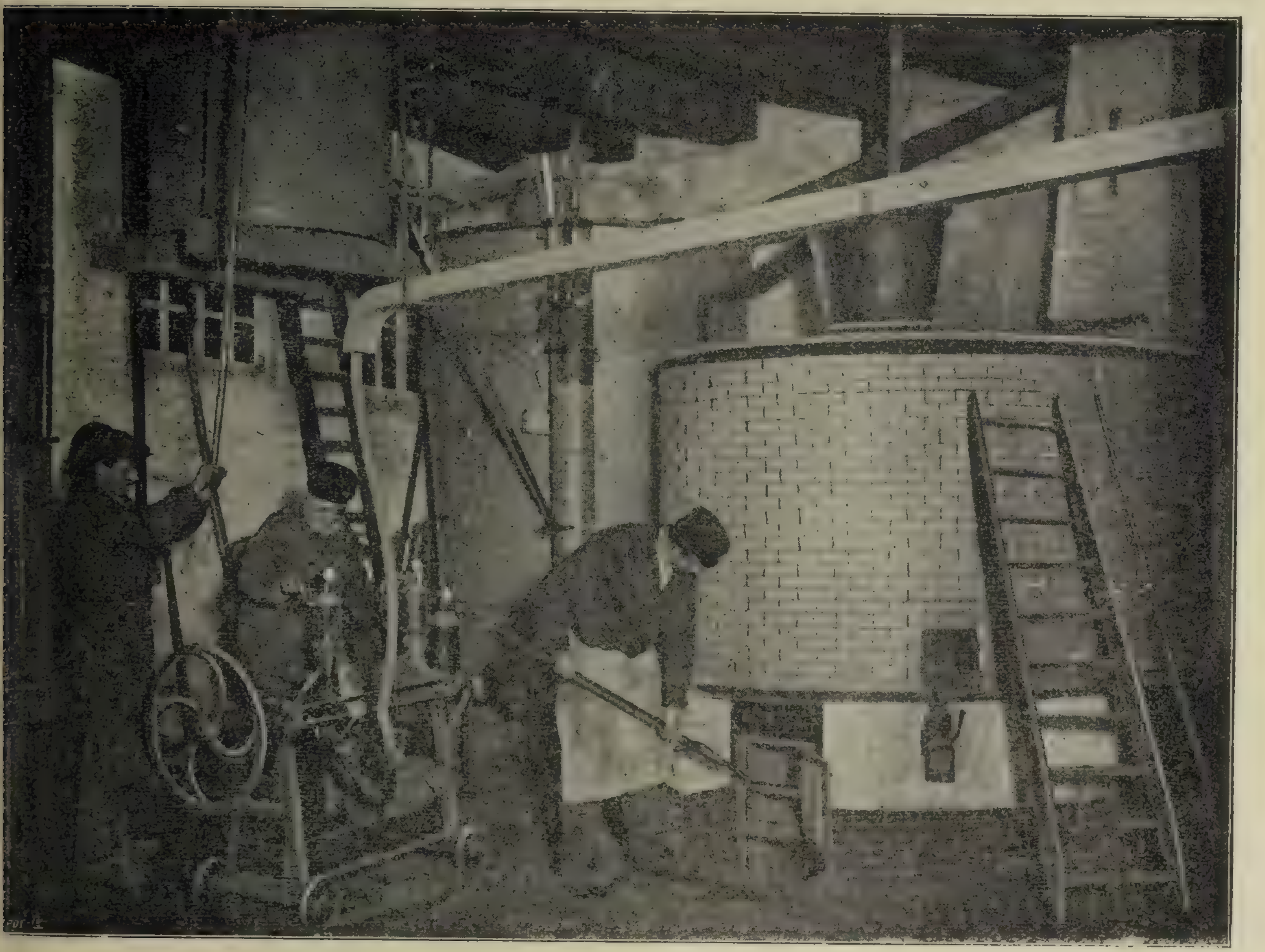
Interior of a malt-house.

The following table makes this clear, in so far as concerns the number of boileries:

BOILERIES OF THE FIRST CLASS USING GRAIN IN THE NETHERLANDS.

	1885	1890	1895	1900	1910
Groningen	3	2	2	1	1
Limburg.	18	18	14	10	3
North Brabant .	2	1	2	—	—
North Holland .	1	—	—	—	—
South Holland .	415	278	215	158	107
Total......	439	297	233	169	111

This decline in the number of boileries is due to two causes, viz. to the fact that the yeast produced by the Schiedam boileries is suffering serious competition from yeast produced elsewhere, reducing materially the profits to be derived from the boilery products, and to the fact that maltwine is no longer the only prime constituent used for the manufacture of gin, it having got a serious rival in the rectified alcohol.



Pot-still apparatus in a distillery.

But although the number of boileries at Schiedam is decreasing, those remaining, which, as has been mentioned before, are generally also gin distilleries, still do a flourishing trade, not only in The Netherlands itself but also abroad, the exports of gin to foreign countries being very considerable indeed.

Alongside of the old established maltwine boileries in later years large alcohol factories have arisen, such as those of Delft and Sappemeer, which make principally grain spirit, and those of Bergen-op-Zoom and Zevenbergen, which make exclusively molasses spirit, and which have been the cause of a large increase in the production of alcohol and of yeast as far as the first-named factory is concerned. This Delft factory also owns important factories in Belgium.

General view in old-style distillery.

The alcohol produced by these factories is, in part, methylated and sold as spirit for burning; but, for the greater part, it serves in the distilleries for the manufacture of gin, liqueurs, etc. The difference in price between alcohol and maltwine has no doubt something to do with the increase in the consumption of alcohol as a primary constituent of this manufacture; but the main cause of the change is to be found in the public taste. At the present moment, preference is often given to a product less pronounced in flavour and scent than the gin derived from maltwine.

The following table gives the total quantity of spirits, produced by the Netherlands maltwine boileries and alcohol factories:

QUANTITY OF SPIRITS PRODUCED IN THE NETHERLANDS

(in hectolitres containing 50 % of alcohol).

YEARS.	In factories employing		Totals.
	grain	molasses	
1895	650,680	21,197	671,877
1896	650,050	25,150	675,200
1897	609,147	76,893	686,040
1898	585,488	104,630	690,118
1899	571,825	110,645	682,470
1900	513,972	188,042	702,014
1901	501,357	211,227	712,584
1902	494,673	214,374	709,047
1903	476,551	216,557	693,108
1904	482,697	252,784	735,481
1905	467,221	236,120	703,341
1906	455,649	250,920	706,569
1907	467,108	285,995	753,103
1908	442,573	287,957	730,530
1909	440,004	270,494	710,498
1910	450,600	250,442	701,042
1911	425,096	249,662	674,758
1912	442,480	286,286	728,766
1913	474,088	312,209	786,297

As we have said, yeast is obtained, in The Netherlands, both in the manufacture of maltwine and of rectified alcohol. In the first form, yeast production is found mainly at Schiedam; in the second, at Delft. The exports of yeast have always very largely exceeded the imports. Of recent years, the imports and exports of yeast (special trade) have amounted, in kilograms, to:

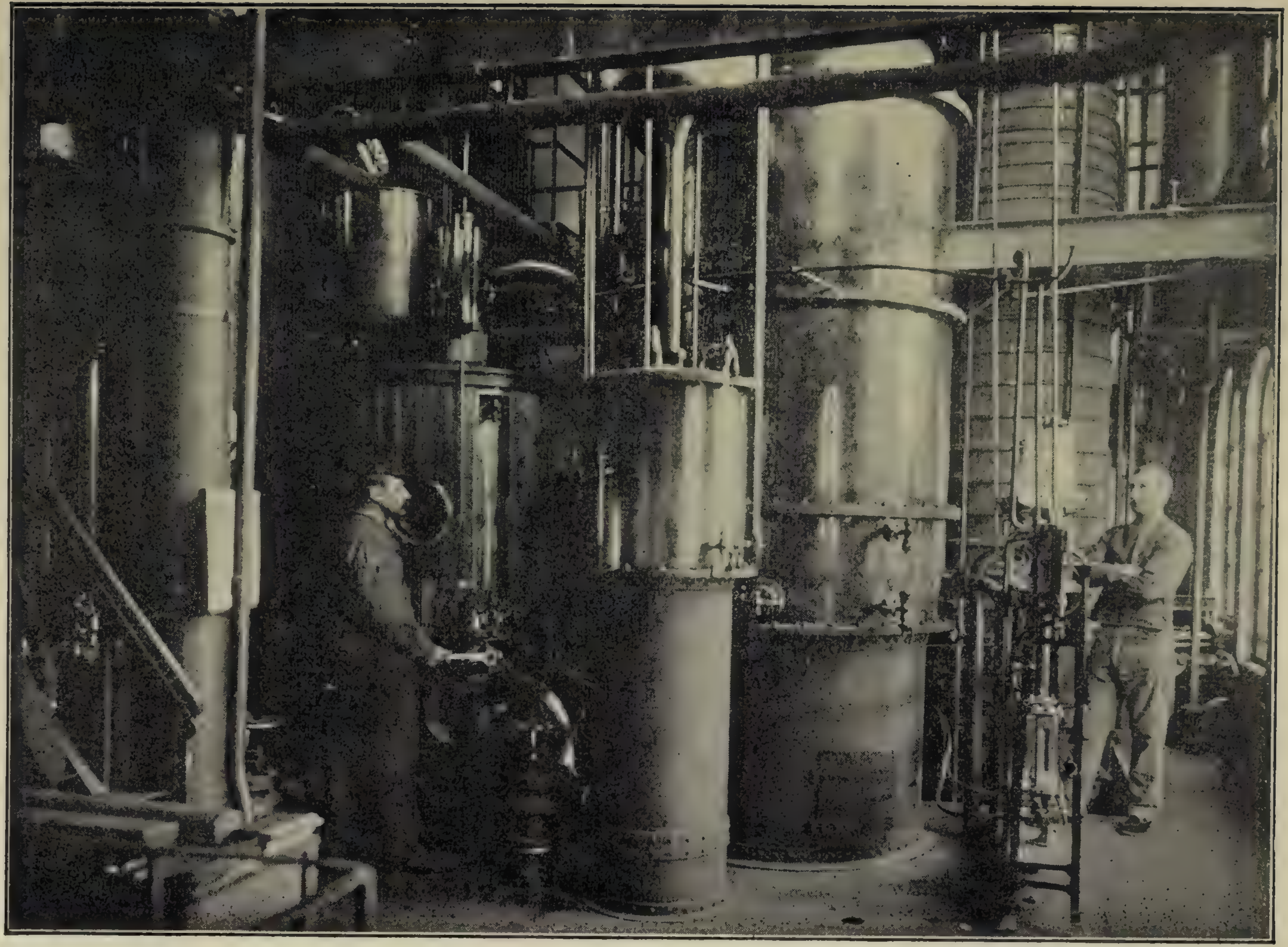
YEARS.	Imports.	Exports.	Excess of Exports over Imports
1901	563,576	5,204,156	4,640,580
1902	267,367	5,149,258	4,881,891
1903	216,522	5,168,775	4,952,253
1904	216,489	5,561,863	5,345,374
1905	161,796	5,359,089	5,197,293
1906	383,455	5,451,275	5,067,820
1907	430,308	5,560,598	5,130,290
1908	632,506	5,490,170	4,857,664
1909	731,735	5,695,664	4,963,929
1910	819,038	5,889,979	5,070,941
1911	1,206,000	5,878,000	4,672,000
1912	1,703,000	6,692,000	4,989,000
1913	1,391,000	6,198,000	4,807,000

Mention has already been made of the other by-product of maltwine and alcohol production from grain, viz. the "spoeling." This article is also sold in a dried state both in other parts of the country and in foreign countries, such as Belgium and Germany.

In The Netherlands, the distilling of liqueurs is a very old-established trade, which has not only been kept up to our day, but which has assumed an international importance. It began to develop as long ago as the second half of the sixteenth century.

In those early days some liqueur distilleries were established which exist even at the present day, have gained a world-wide reputation and have made Netherlands liqueurs famous all over the world thanks to the perfect purity and exquisite flavour of their products.

Apart from these oldest liqueur distilleries, there are a



Distilling boilers in the Yeast and Spirit Manufactory at Delft.

large number of others, also in the provincial towns. The number of distilleries of spirits and liqueurs, which was 230 in 1885, is at present about 350. The greater part of these are in South Holland (152), North Holland (73) and Gelderland (37). Many of them, however, are of very slight importance and their products are known only in the country, or even only in the particular locality where they exist.

For the preparation of the liqueurs, The Netherlands themselves supply, in addition to different sorts of fruits, a certain number of aromatic spices, such as caraway and coriander seeds, acorusroot, &c , which are partly produced in the well-known spice-gardens of Noordwyk.

In addition to the distillers and liqueur manufacturers, there are a dozen manufacturers of bitters and elixirs in The Netherlands, selling several specialities of this class.

The distilleries and liqueur factories, combined or separate, dispose of their produce in the country or abroad. There are important establishments of this class at Amsterdam, Culemborg, Delft, Doetinchem, Dokkum, The Hague, Leyden, Rotterdam and Schiedam.

WINES, CIDERS AND MINERAL WATERS.

There is no grape-wine made in The Netherlands. The delicious black and white grapes of the "Westland", which have received the highest awards at numberless agricultural exhibitions, fetch, because of their superior quality, a much higher price, as dessert fruit, than would be obtained if they were employed for making wine. They are exported to Great Britain, Germany and elsewhere and also sold at home.

The manufacture and sale of spirits and liqueurs is often combined with the trade in foreign wines, including the wines of France, Germany, Spain, Portugal, Algeria, California, Italy, Greece, The Cape, &c.

The wine trade has remained almost stationary during the last forty years: the imports and exports have kept up their respective figures. In spite of the increase of the population, the excess of imports over exports has hardly varied since 1867. It continues steady at between 90,000 and 100,000 hectolitres. The cause of this phenomenon is probably to be found in the increasing consumption of beers, non-alcoholic beverages and mineral waters that have partly supplanted wine in The Netherlands, where it tends to become more and more an article of luxury

Ciders are manufactured in The Netherlands from gooseberries, apples, cherries, &c., with or without alcohol. The most important factories of these products are at Alphen-on-Rhine (3), Elst, Oudshoorn, Ochten, Loppersum and Zutphen. Often, the same factories also make *fruit extracts*, *fruit-syrups*, *syrups for lemonades* and *jams*, although these industries likewise exist by themselves, either separately or combined with the manufacture of preserved fruits and other similar products. Factories of some importance producing fruit extracts, fruit syrups, jams, &c., are established at, among other places, Amsterdam, Altena near Nymwegen, Dieren, Enkhuizen, Groningen, Haarlem, Prinsenhage, Tiel, Utrecht and Zaandam. This industry finds an outlet for its products abroad, especially as regards the fruit extracts, syrups and ciders, in Belgium, Germany, Switzerland, Italy and South America.

Mineral waters and *aerated beverages* are manufactured in most of the towns for local requirements and, on a larger scale, in steam factories at, among other places, Amsterdam, The Hague, Haarlem, Nymwegen, Rotterdam and Utrecht.

VINEGAR.

Vinegar is manufactured in The Netherlands by 58 firms which use *distilling products* exclusively, 3 which employ *raisins*, 18 which make use of both materials and 2 which make vinegar from other products.

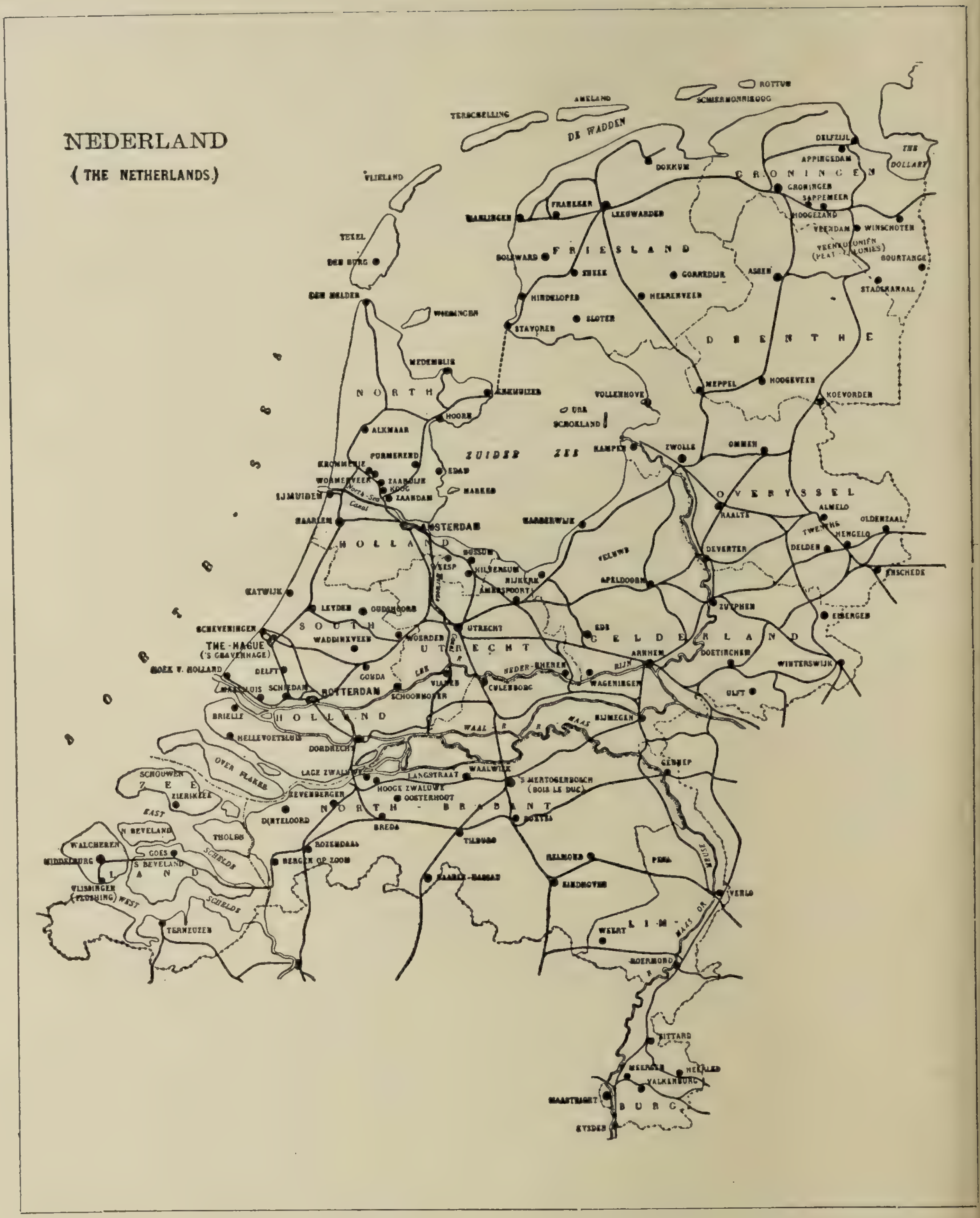
These factories are distributed all over the country. In 1913 the excise duties on vinegar produced 191,982 guilders (£ 16,000), which figure represented a quantity of 239,977 hectolitres, tested at 30 grams of pure acetic acid.

The consumption per head of the inhabitants (allowing for the increase in the population) was 2,90 litres, as against 3,49 litres ten years ago.

This decrease must be ascribed to the growing consumption of essence of vinegar, a product manufactured here and there in The Netherlands, but also imported.

THE INDUSTRIES OF THE NETHERLANDS.

COMPILED BY THE COMMERCIAL DEPARTMENT OF THE
MINISTRY OF AGRICULTURE, INDUSTRY AND COMMERCE
WITH SPECIAL ASSISTANCE OF MR. P DOYER, SECRETARY
TO THE ROYAL NATIONAL RELIEF COMMITTEE.



NEDERLAND

(THE NETHERLANDS)

N471g
no.1

THE INDUSTRIES OF THE NETHERLANDS.

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PART V.

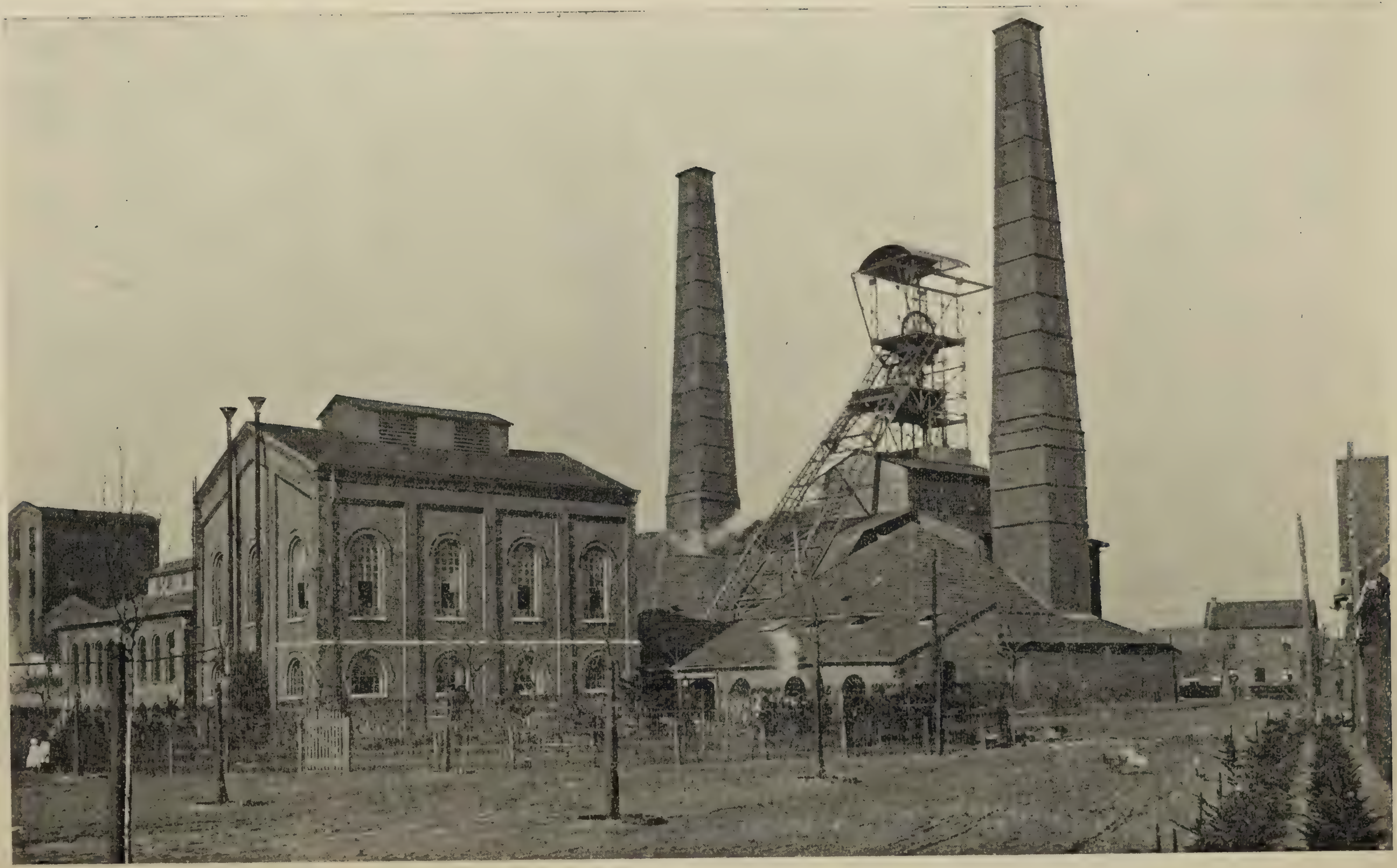
THE DELVING INDUSTRIES, THE ORE TRADE, MACHINE CONSTRUCTION AND SHIPBUILDING, THE METAL INDUSTRY, THE DIAMOND AND GOLDSMITH'S TRADES.

I. THE MINES.

THE mining industry has only lately assumed a certain importance in The Netherlands. Not long ago, it hardly counted among the different branches of industry in the country; and people would mention as a curious detail that coal mines existed somewhere, in a remote corner of the country, which nothing seemed to mark out for this sort of working.

The situation is very different to-day. Experience has shown that it is possible to work important collieries within the boundaries of The Netherlands. This is proved by a number of coal-mines perfectly equipped in every way; and geological research has established the fact that, in spite of the composition of the surface layer, the Netherlands subsoil contains minerals that can be worked in considerable quantities.

It was known even in the old days that the southern extremity of Limburg possessed coal. As long ago as the middle ages, coal was extracted in the Kerkrade district; and, at the beginning of the eighteenth century, the Abbey of Kloosterrade (Rolduc), which is in this neighbourhood, had a coal-mine which passed into the hands of the State during the French occupation.



The Domanial Colliery at Kerkrade.

These coal strata were looked upon as being very shallow and, consequently, easy to work as an extension of the adjoining basin at Worm; and people hardly suspected that there were very rich seams further in the interior of Limburg.

The French Government and, later, after 1815, the Government of the newly-formed Kingdom of The Netherlands, themselves worked the mine of the Abbey of Rolduc, under the name of the Domanial Mine, as State property, while the other coal-fields in the neighbourhood were granted to private concessionaries, under the name of the Neuprick-Bleyerheyde Colliery.

This colliery, half of which is on German territory, does not fill a very important place in this general review of the Netherlands mining industry. It was worked consistently until 1904. in which year it was abandoned.

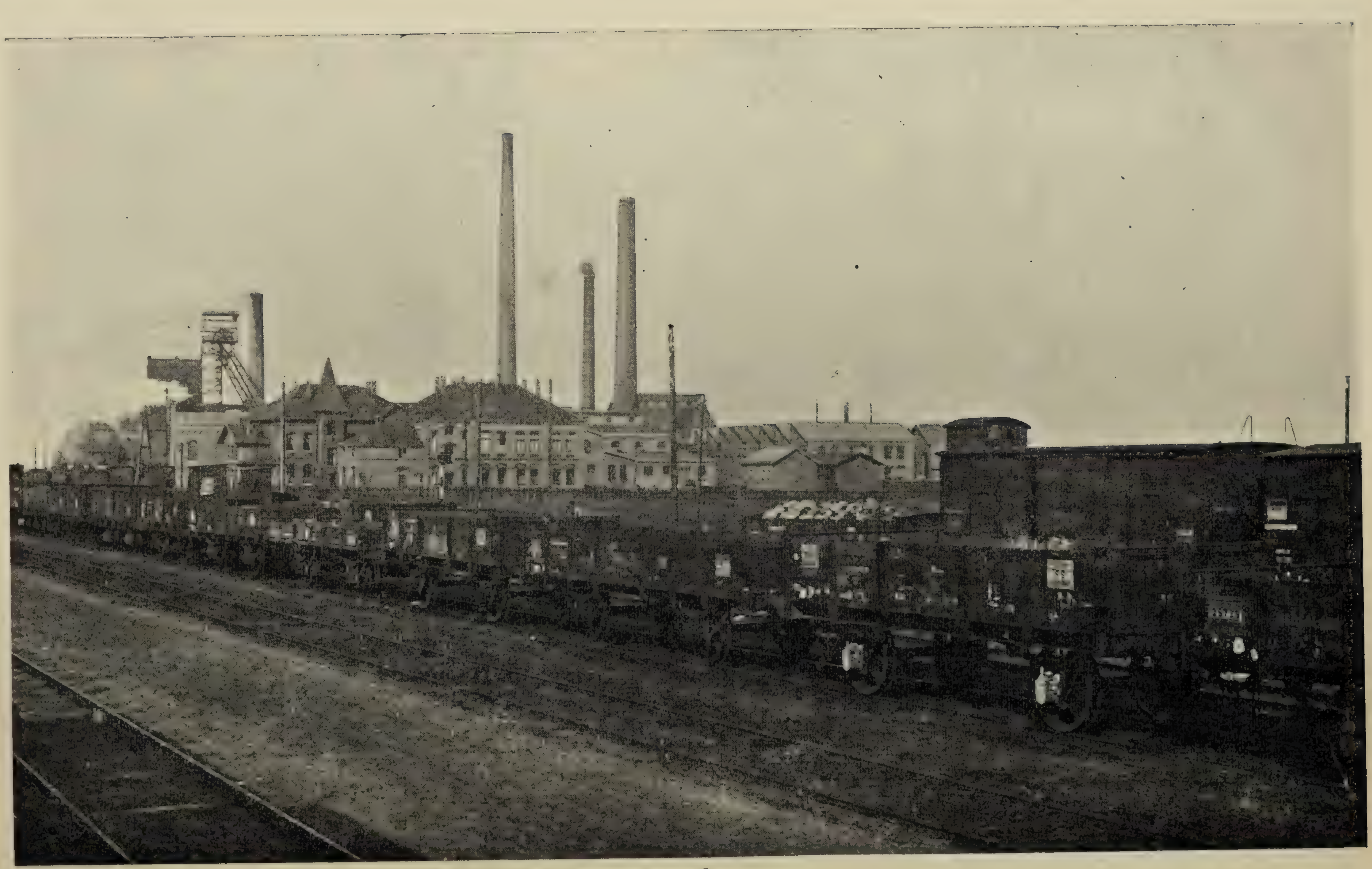
The Domanial Mine was unfavourably situated as regards means of communication, and its importance to the country in general was very small.

When, therefore, in 1842, the States General refused to assist in building a railway line between Maastricht and Aix-la-Chapelle, and when private individuals offered to construct this line in return for the right to work the Domanial Mine, the Government cheerfully consented; and in this way the Company owning the Aix-la-Chapelle and Maastricht railway obtained a concession of this coal-mine for a term of 99 years.

A number of borings effected between 1857 and 1859 had as their result that, in 1860 and 1861, two concessions were granted, known as the Willem and Sophia Concessions.

The working of one of these coal-fields (the Willem Concession), undertaken in 1876 by the "Bergwerksvereeniging voor Nederland" (Netherlands Mining Association) led to nothing but disappointment. The nature of the sub-soil and its rising sands caused the undertaking to fail, and it was declared bankrupt in 1881.

A new company took over the two coal-fields, continued the sinking of the shaft in 1899 and applied the freezing process. This new method succeeded; and the first coal was extracted in 1901.



The Oranje-Nassau Colliery at Heerlen.

Meanwhile, during the years 1872 to 1876, certainly in consequence of the Willem and Sophia Concessions and as undoubtedly owing to the prosperity which the German manufactories were then enjoying, other borings were made which resulted in the granting of certain concessions.

A certain number of these concessions lapsed for the reason that the guarantee capital had not been subscribed; and, in their place, the Oranje-Nassau Concession was started in 1893 and commenced to sink the shaft in the same year. This operation, which was not worked by the freezing process, had to contend with numberless difficulties; and it was not until 1899 that it became possible to start the working of the mine.

Among the concessions that continued in being, three, the Laura, the Vereeniging and the Carl, started sinking operations, the first two in 1900 and the last in 1898. The working of the seams began in 1905 and 1904 respectively.

There were, therefore, in existence in 1898, besides the old Domanial Mine and the Neuprick-Bleyerheyde Colliery, six private concessions. The Limburg coal basin seemed to attract attention in the latter years of the last century, and its prospecting was carried on in various places, if not systematically, at any rate energetically. This resulted in a large number of applications for concessions, sometimes for many on the same spot. The result was that, in 1899, the Government appointed an advisory committee, in order to ascertain the best manner in which to lease the coal-fields, in so far as they were not reserved for the State.

The committee advised the reserving of a portion for the State (about 4,515 hectares) and the concession of the remainder (about 10,000 hectares).

The Government created a new department, that of exploration, which has already produced important results. The borings which it has effected have demonstrated that, over and above the lands already conceded, amounting to some 23,000 hectares, which contain coal, and a batch of adjacent lands prospected by private individuals, about 6,000 hectares in extent and containing deposits of coal, there remains in The Netherlands an extent of territory of about

17,000 hectares in the North of Limburg and the eastern part of North Brabant, which contains coal, and another, in the eastern part of Gelderland, of about 2,000 hectares, where coal, rock salt and potassium are found. The prospecting is still being carried on.

Considering the very short time in which it has been possible to give serious attention to this working and to organize it on a large scale, it is permissible to say that the mining industry has already developed on a scale of no small importance.

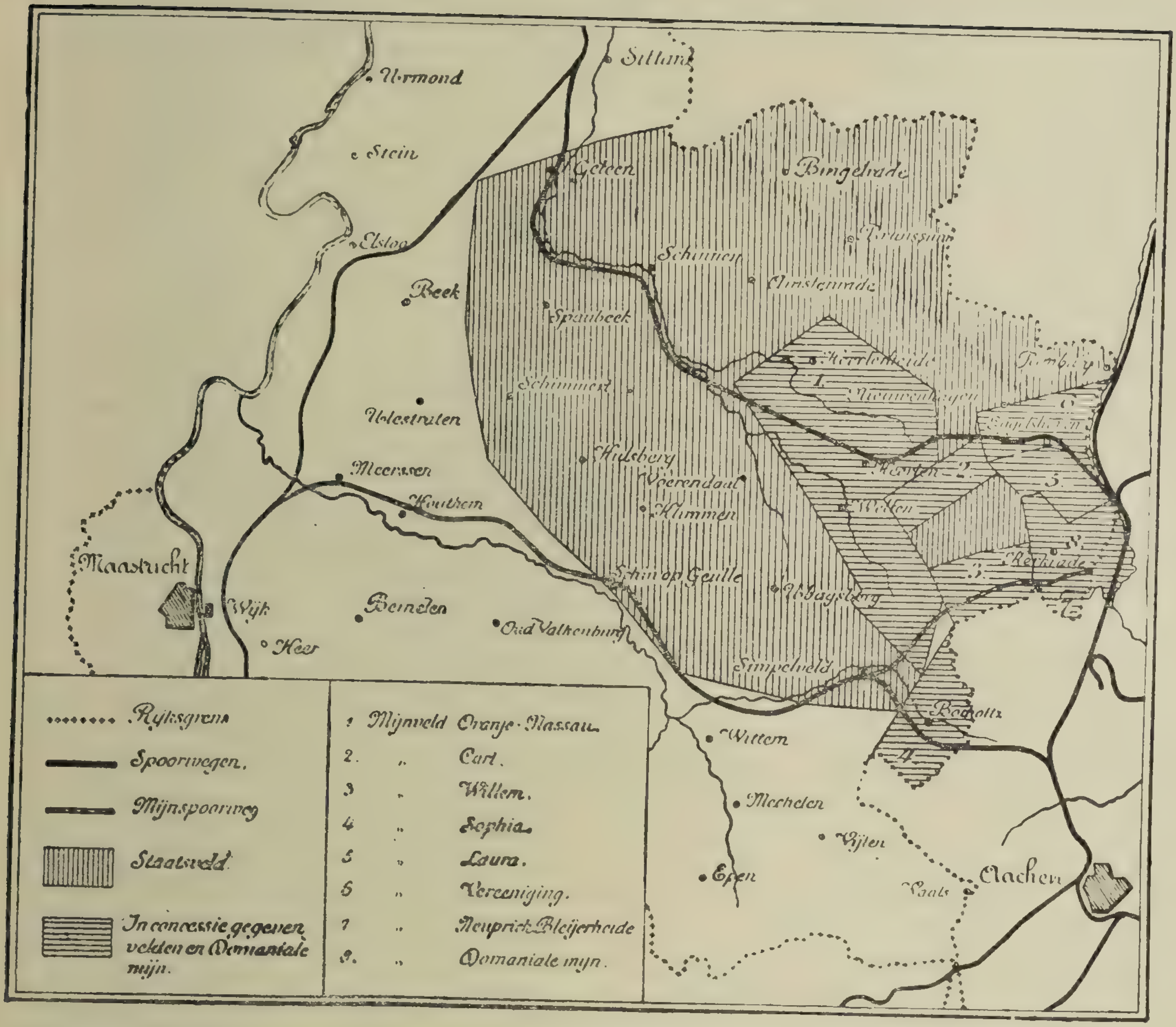
This is proved by the fact that the number of miners engaged in coal-mines has increased tenfold within the last ten years. Whereas the number in 1898 was 489 persons, it was 10,728 on the 31st of December, 1913 (8,161 of whom were Netherlands subjects). Given that 76 % of the miners belong to our country, we may be permitted to look upon our mines as a national industry.

The number of collieries working now is 7: the Government mines in Limburg (two mines working, known as the Wilhelmina and the Emma, and another known as the Hendrik being prepared for working); the State Colliery, or Domanial Mine at Kerkrade (one mine); the company working the Limburg collieries at Heerlen (two mines working, known as Oranje-Nassau I and II, and another prepared for working known as the Oranje-Nassau III); the Laura and Vereeniging United Collieries Co., Ltd., at Eygelshoven (one mine); and the Willem—Sophia Netherlands Colliery Co., Ltd., at Speckholzerheide (one mine).

The above-named concessions are shown in the map on next page; the following is a translation of the explanatory inset:

··········	Frontier-line of the Kingdom.
———	Railways.
┼┼┼┼	Colliery railway lines.
▥	Government collieries.
▤	Private concessions and Domanial Mine.

1. Oranje-Nassau	Concession.
2. Carl	„
3. Willem	„
4. Sophia	„
5. Laura	„
6. Vereeniging	„
7. Neuprick-Bleyerheyde	„
8. Domanial Mine.	



Map of the Mine Concessions in Limburg.

View of a Government Colliery (the Wilhelmina Mine at Heerlen).

The following table gives the net output of the mines at present working:

YEAR.	Number of collieries working	Output in tons of 1,000 kilograms.	Quantities sold		
			In tons of 1,000 kilograms.	In the Netherlands (percentage)	Abroad (percentage)
1877	2	55,517	—	—	—
1883	2	85,521	—	—	—
1889	2	101,375	—	—	—
1895	2	126,614	123,236	—	—
1898	2	150,398	147,226	—	—
1899	3	212,973	202,544	—	—
1900	3	320,225	303,492	35.8	64.2
1901	3	312,717	286,25	45.3	54.7
1902	4	399,133	368,170	35.4	64.6
1903	4	487,777	440,893	36	64
1904	4	466,997	400,757	45	55
1905	3	500,487	449,116	38.4	61.6
1906	4	566,238	498,301	30.1	69.6
1907	6	722,824	647,272	27.5	72.5
1908	6	908,201	853,294	30.9	69.1
1909	6	1,120,852	1.046,501	30.1	69.9
1910	6	1,292,289	1,216,740	32	68
1911	6	1,476,580	1,426,042	34.2	65.8
1912	6	1,725,394	1,680,147	32.8	67.2
1913	6	1,873,079	1,774,140	35.9	64.1

The following is the value of the coal output of The Netherlands during the last 19 years (in guilders):

YEAR	Average price per ton	Total trade value of output	YEAR.	Average price per ton	Total trade value of output
1895	fl. 4.06	fl. 514,053	1905	fl. 5.35	fl. 2,505,817
1896	» 4.05	» 558,037	1906	» 5.73	» 2,937,260
1897	» 4.25	» 638,116	1907	» 7.19	» 4,918,568
1898	» 4.54	» 682,807	1908	» 7.11	» 6,240,540
1899	» 4.94	» 1,052,086	1909	» 6.80^5	» 7,345,515
1900	» 6.34	» 2,030,220	1910	» 6.59	» 8,230,941
1901	» 6.14	» 1,920,082	1911	» 6.50	» 9,597,770
1002	» 5.55	» 2,215,188	1912	» 7.01	» 12,095,012
1903	» 5.24	» 2,555,951	1913	» 7.85	» 14,703,670
1904	» 5.23	» 2,442,394			

1 guilder = 1*s.* 8*d.*

These figures show in a striking manner the development of the mining industry in The Netherlands, a development which to-day is also attracting attention abroad.

It is very probable that mining enterprise in Limburg will now largely develop and that this part of The Netherlands will prove ere long one of the principal centres of Netherlands industry. Everything tends to the belief that The Netherlands now realize that it is time the national underground treasures were worked.

The coal extracted, especially the slow-burning coal, is very suitable for domestic use.

Thanks to the installation of the latest machinery for separation, washing and loading, the coal from these quite modern mines is delivered in the best condition; and it is not to be wondered at that it has been favourably received on the home markets and on those of Germany, Belgium and France.

II. THE PEAT-BOGS.

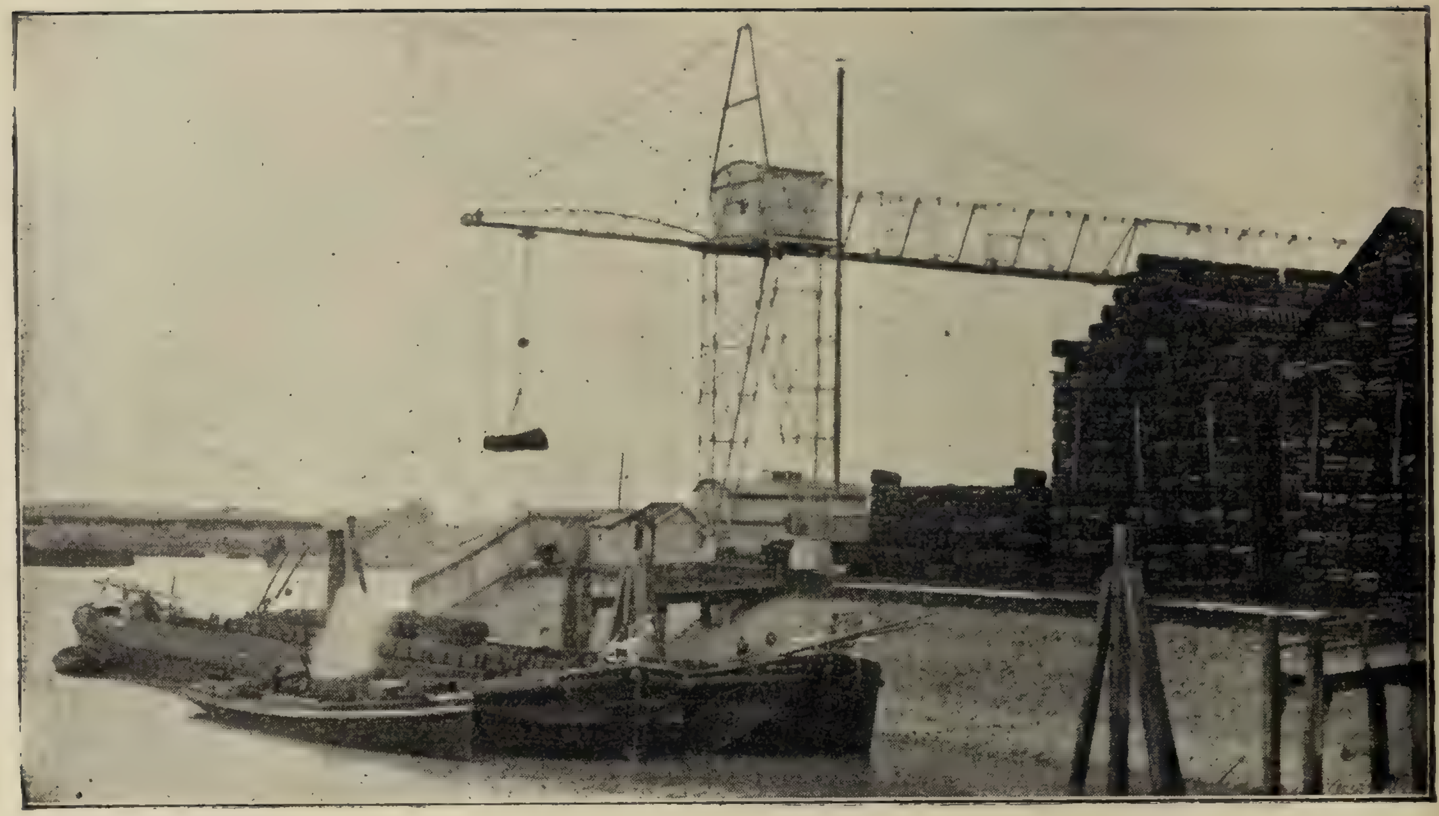
Up to recent times, peat has remained the national fuel of The Netherlands. In former days, it was the principal article of fuel in the different branches of Netherlands industry, especially in the brick-works, tile-works, breweries, glass-works, etc. Nowadays it is still used in the factories of the "Groninger Veenkoloniën" for stoking the engine furnaces. Following on the centuries-old consumption of peat, enormous peat-bogs, divided into high and low bogs, have been cut. The result has been, in the case of the high bogs, that those lands which were formerly barren tracts have become fertile, for usually, under the layer of peat, we find an earth, known as *dalgrond* in Netherlands, which is extremely suitable for agricultural purposes. We see a remarkable illustration of this in the province of Groningen. From the sixteenth century onward, the peat has been systematically cut, with the result that. to-day, nearly all the peat has been removed and the fertile soil beneath has been exposed. Here they grow the potatoes and wheat which furnish the raw material for the starch and straw-board factories.

The canals which were dug in former days for the "Veenkoloniën" (peat-bog colonies) and which are still in excellent condition, have assisted the development of these industries considerably. The total length of the canals in the three northern provinces is 1,562 kilometers.

In the low bogs, the digging of the turf resulted in the creation of pools of water, which were afterwards drained and which also produced fertile lands.

The working of the peat-bogs has therefore largely contributed to the improvement of the Netherlands soil.

The cutting of the high bogs continues. The following table shows the number of hectares cut during the last five years and the extent of *dalgrond* turned into arable land:



Storing bales of moss-litter at Rotterdam.

View of the moss-litter factories at Griendtsveen.

YEAR.	High peat-bogs worked	High peat-bogs exhausted and broken up into arable land
	Hectares	Hectares
1905	599	709
1906	469	575
1907	527	520
1908	340	545
1909	364	441
1910	417	455
1911	429	502
1912	403	727
1913	572	974

From the high bogs is extracted a kind of peat known as "long peat." The principal districts where this cutting is done are the eastern portion of North Brabant, known as "De Peel" (Helenaveen, Deurne and Griendtsveen), the eastern part of Drenthe (Emmen, Dalen, Borger, Hoogeveen, Schoonebeek, Westerbork and Smilde), and the eastern part of Overyssel (Hardenberg, Gramsbergen, Vriezenveen, Vroomshoop and Ommen).

The following is the approximate output of "long peat" in these districts:

"De Peel"	100	million pieces.
Drenthe	1,200	" "
Overyssel	300	" "
Other districts	200	" "
Say, in all	1,800	million pieces,

representing a value of about 6½ million guilders, or over £ 500,000.

The low bogs produce principally short peat, the preparation of which demands a series of operations. The low peat-bogs are found and worked in nearly every province, but mainly in North and South Holland, Utrecht, Friesland, Overyssel and Drenthe. The annual yield of short peat is about 700 million pieces, distributed as follows:

View of a peat-bog at Griendtsveen.

Loading the peat.

North and South Holland	200	million
Friesland	180	"
Drenthe	150	"
Overyssel	120	"
Other provinces	50	"

The selling value of this peat on the spot is $1^{1}/_{2}$ million guilders (£ 125,000). The peat is sold only in the country itself.

Side by side with the immemorial cutting of the peat, there has sprung into existence, during the last 30 years, a new industry, namely that of moss-litter, which is used for a variety of purposes. The light, porous, pale-brown peat found at the surface of the bogs, to a depth of $1^{1}/_{2}$ to $4^{1}/_{2}$ feet, is used for making moss-litter. This operation is performed in factories, of which a large number are owned by the proprietors of peat-bogs producing that particular kind of peat, who also obtain their raw material from other bogs. The principal bogs possessing these factories are situated in the south of North Brabant and in the western portion of Limburg (Deurne, Asten, Griendtsveen and Helenaveen), where one parish, in particular, and several large limited companies are concerned in this industry; and in the north-east of the country (Groningen, Drenthe and Overyssel), at Dedemsvaart, Hoogeveen, Klazienaveen, Nieuw-Amsterdam, Onstwedde, Oranjekanaal, Stadskanaal and Vroomshoop. In North Brabant, the layers of light peat are gradually being exhausted, for which reason a Brabant company is endeavouring to keep up its supply by erecting factories near its own peat-bogs in Drenthe.

In the factories, the peat, dried in the open air by sun and wind alone, is broken up and afterwards compressed into bales of 100 kilograms.

Some of these factories also make, with short peat, blocks that serve the same purpose as lignite blocks.

The use of moss-litter is increasing and, in many cases, it is used in stables instead of straw. Even of late, in spite of the decrease of horse traffic and its being supplanted by mechanical traction, the sale of peat for litter is constantly increasing.

In agriculture, moss-litter is being more and more used for covering seedplots and fields of bulbous plants. Mixed in certain proportions with molasses, peat makes an excellent cattlefood, which enjoys a large sale.

Lastly, peat is also used for packing fruit (especially tomatoes).

Seeing that peat is used for so many different purposes, it naturally follows that the annual output of The Netherlands (about 200,000 tons) finds large and ever-increasing markets. Only a tenth of this produce remains in the country; the rest is sent to England, France, Belgium, America and Germany. A small quantity is shipped to Spain. It is exported mostly by way of Amsterdam, Rotterdam and Harlingen. The exports to Belgium and France go by rail.

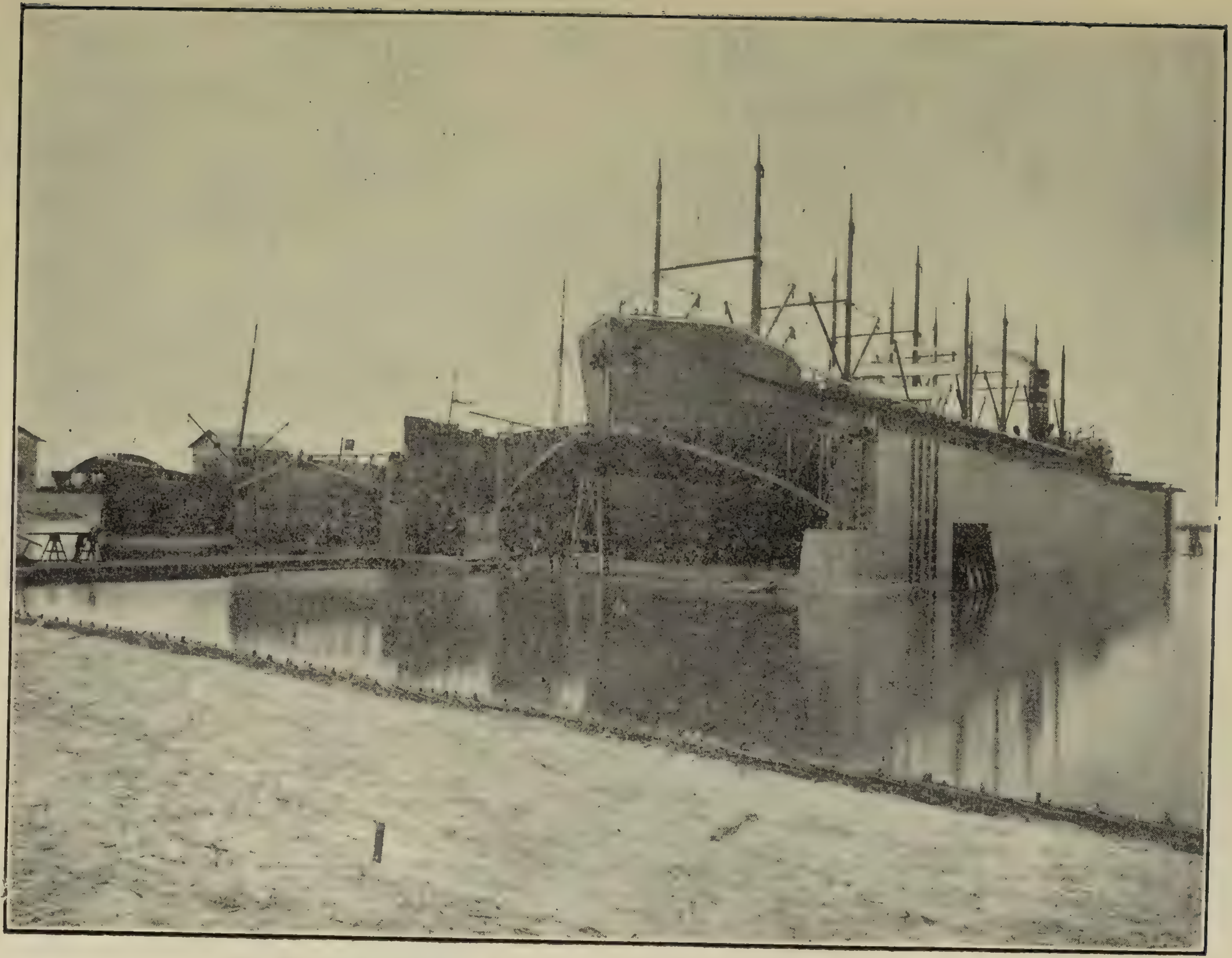
III. THE QUARRIES.

There is hardly any stone formation in The Netherlands, at any rate on the surface of the soil; and it is therefore worth noting that, in the south of Limburg, in the Petersberg and the Geule Valley, there are sandstone quarries that rank among the most ancient underground works in Europe. They are constantly referred to in old manuscripts, and it has been ascertained that they were very extensive even in those days when, as is proved by ruins dating to well back in the middle ages, the marly stone of Limburg was already used for building material.

The quarries are only of small importance to day. During the last four years, nine quarries have been worked. The average annual output was 21,000 cubic meters. The blocks sawn in these quarries have an unvarying dimension of 80 × 55 × 55 centimeters.

Marl-sand (*mergelzand*) is another product of the Limburg quarries: it is a powder produced in sawing the blocks or obtained by purposely grinding the stone. This powder is now made in fairly large quantities and used as a calcareous manure in the low-lying, marshy districts.

The output for 1913 amounted, in round figures, to 10,000,000 kilograms.



The "Grängesberg," specially built for ore transport, docking.

IV. THE ORE TRADE.

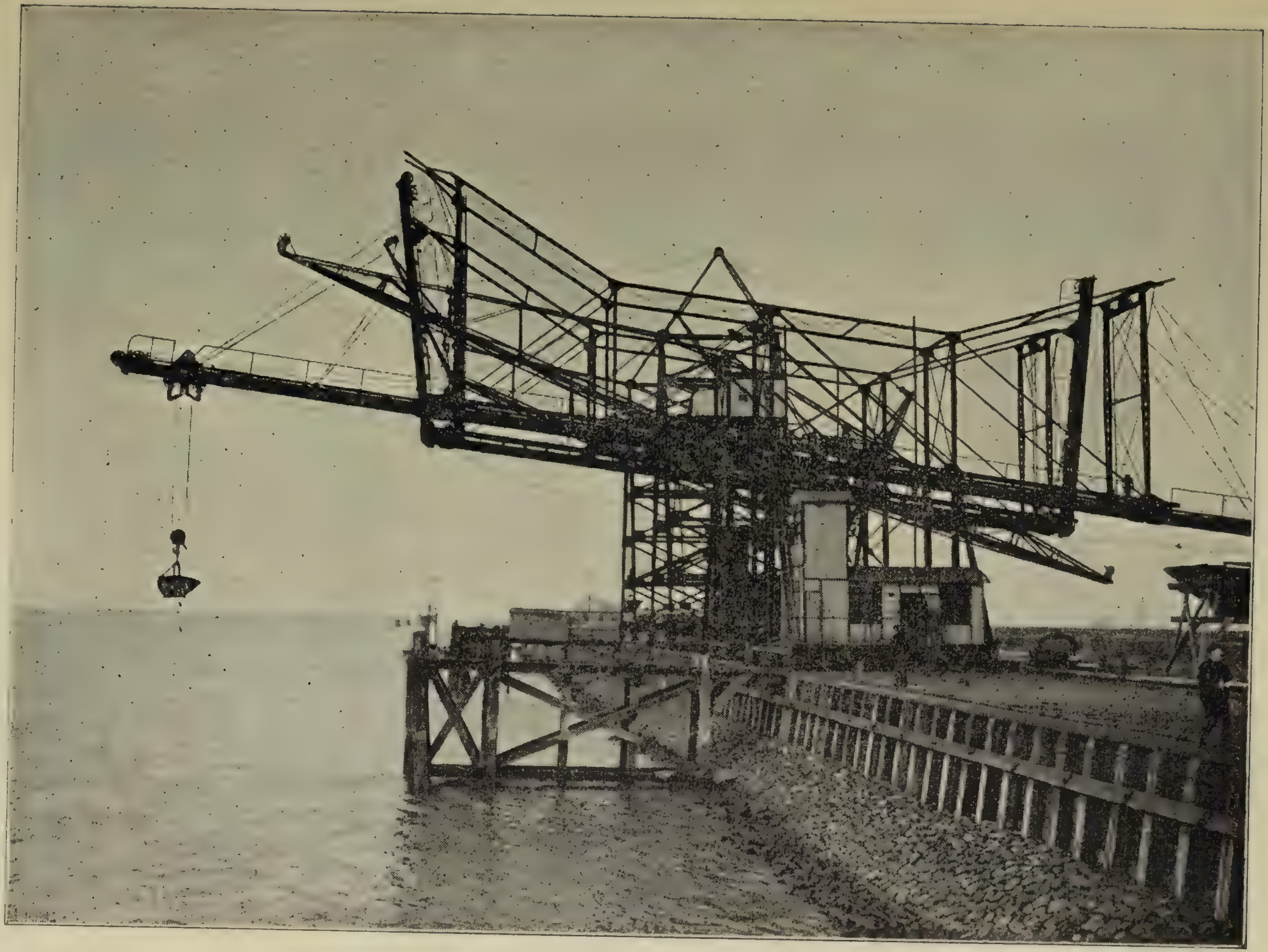
One of the most important articles of commerce and transport in The Netherlands is ore. Since 1877 especially, an enormous increase has been recorded in the quantities of this article imported.

This considerable rise in the quantity of imported ores is mainly due to the enormous development of the metal industry in the manufacturing districts of Westphalia and the Rhine Provinces, Rotterdam and Amsterdam being the great receiving ports, for those parts, of the raw material used by the said industry.

Whereas, in 1895, the receipts of grain, in so far as the imports by sea are concerned, still held first place, with a total of 3,491,000 tons, in 1900 the ores had already exceeded them with receipts of 3,156,000 tons, as against 2,598,000 tons of grain received in the same year. From that time onwards, ores have supplied the highest percentage of all the imports of the port of Rotterdam, which is undoubtedly the first port in the world for the importation of ores. It is not alone the extremely favourable position of this port that is responsible for the development of an extensive transit trade in ores; it has been largely influenced by the energy and enterprise of certain Rotterdam firms, which, side by side with the *carrying trade*, have established a large *commerce* in that article in their city.

Some of these firms do not even confine themselves to trading in ores, but own valuable mines in various countries such as Spain, Algeria, Morocco, Sweden, France, Greece, &c. One of these Rotterdam firms alone owns a dozen mines, employing about 2,500 workmen and with an annual output of close upon a million tons of ore.

Among the kinds imported, iron ore holds first place. The following figures show clearly the increase in the importation of iron ore in The Netherlands:



A part of the special harbor for unloading ore, showing one of the giant cranes.

IMPORTS AND EXPORTS OF IRON ORE FROM 1877—1913
(in tons of 1,000,000 kilograms)

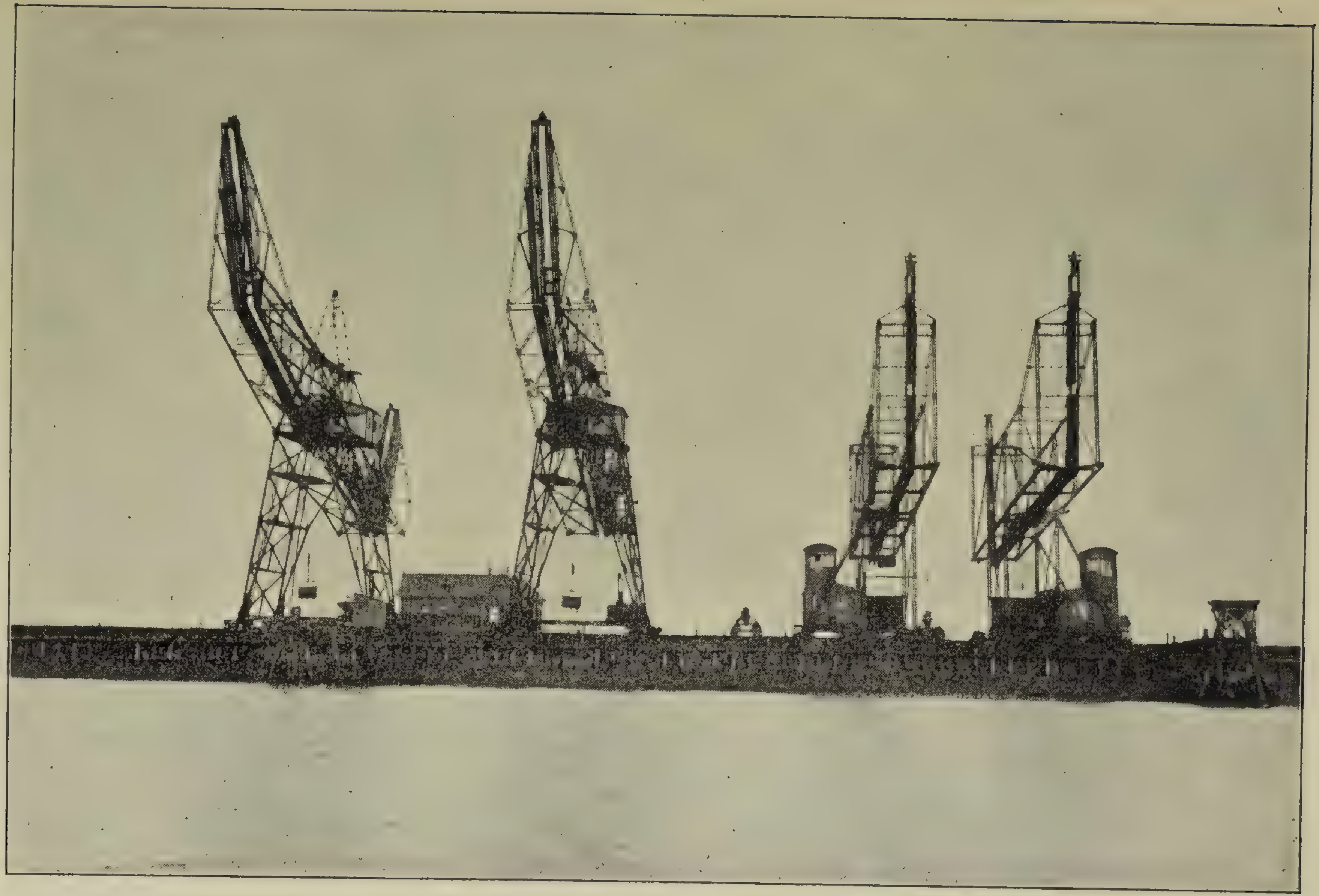
YEARS	IMPORTS Special trade	EXPORTS. Special trade
1877—86 (average)	474,000	493,000
1887—96 »	1,294,000	1,885,000
1897—1906 »	3,664,000	3,856,000
1907	5,562,000	5,865,000
1908	4,831,000	5,018,000
1909	5,229,000	5,604,000
1910	5,942,000	6,354,000
1911	6,251,000	6,598,000
1912	7,762,000	4,736,000
1913	8,622,000	8,745,000

Next in importance to iron comes manganese ore, followed, in the order of the quantities imported, by pyrites and copper pyrites, whilst others, such as zinc ore, nickel ore, chrome ore, strontium ore, &c., are imported in less important quantities.

The following figures show:

IMPORTS OF ALL SORTS OF ORE FROM 1904—1913
(in tons of 1,000 kilograms)

1904	5,381,570
1905	5,539,250
1906	6,736,190
1907	6,930,497
1908	6,141,251
1909	6,608,579
1910	7,507,577
1911	7,685,076
1912	9,197,975
1913	10,289,345



View of the special harbor for unloading ore situated between the Hook of Holland and Maassluis.

About 84 % of the ore is imported at Rotterdam. This port and Amsterdam are admirally equipped for this kind of transport; and the question of unloading the great ore-carrying ships with the greatest possible speed has been solved in a perfect manner.

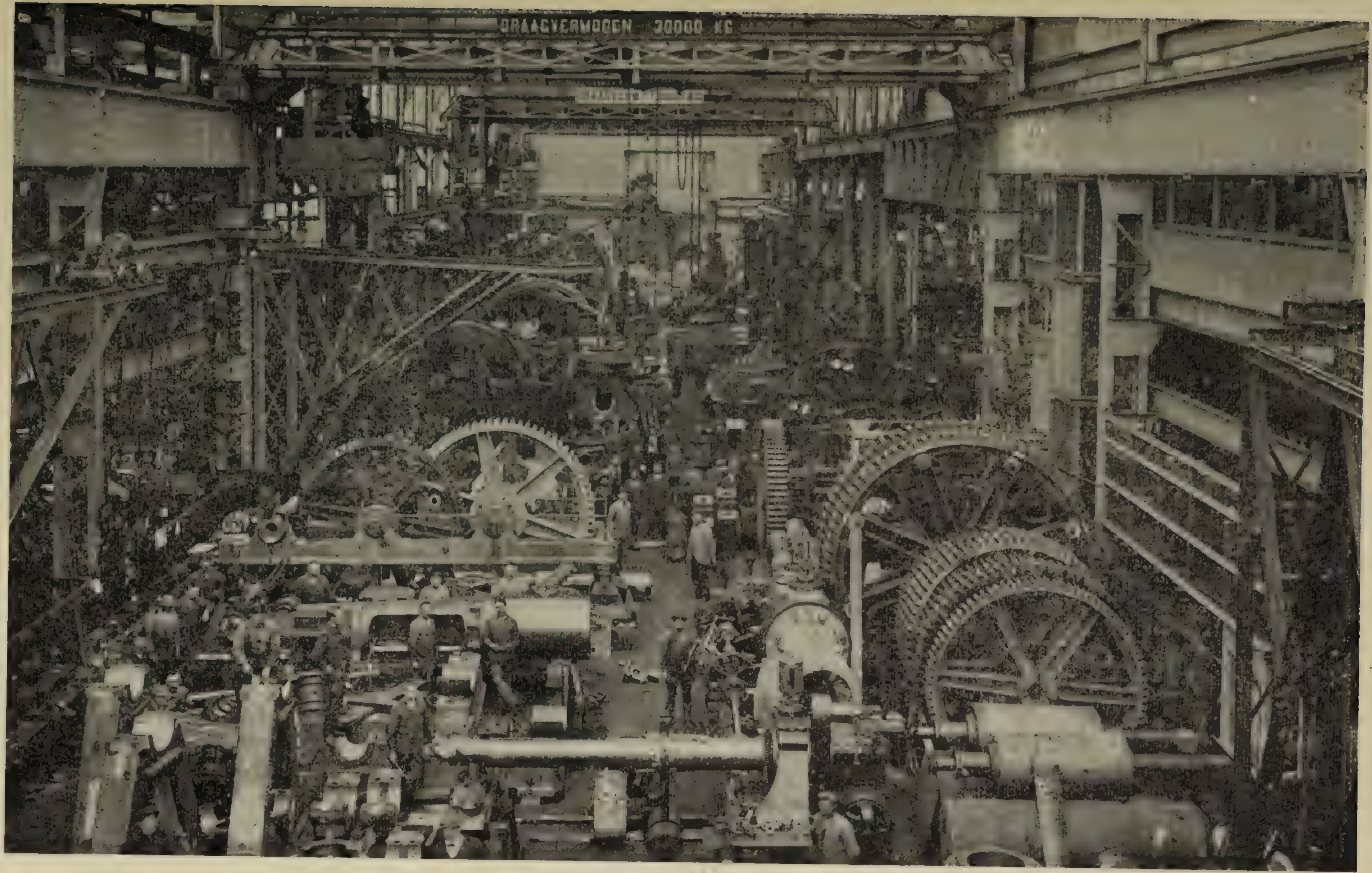
One of the Rotterdam firms engaged in this business settled the difficulty in the following way. Special vessels were built to its order, carrying powerful machinery for loading and unloading and able to discharge the whole of their cargo in 24 hours or to tranship it to the Rhine boats in the same space of time. This is done either in midstream or in large docks where the vessels are moored to buoys. One of the largest of the vessels specially built for this purpose is the "Grängesberg," with a displacement of 4,379 tons Moorsom and carrying fourteen steel masts.

Another big Rotterdam firm, owning mines and also ships to convey the ores extracted from them, has built, between the Hook of Holland and Maassluis, a harbour specially fitted for the unloading of this kind of cargo. It has four gigantic cranes worked by steam supplied from a central station.

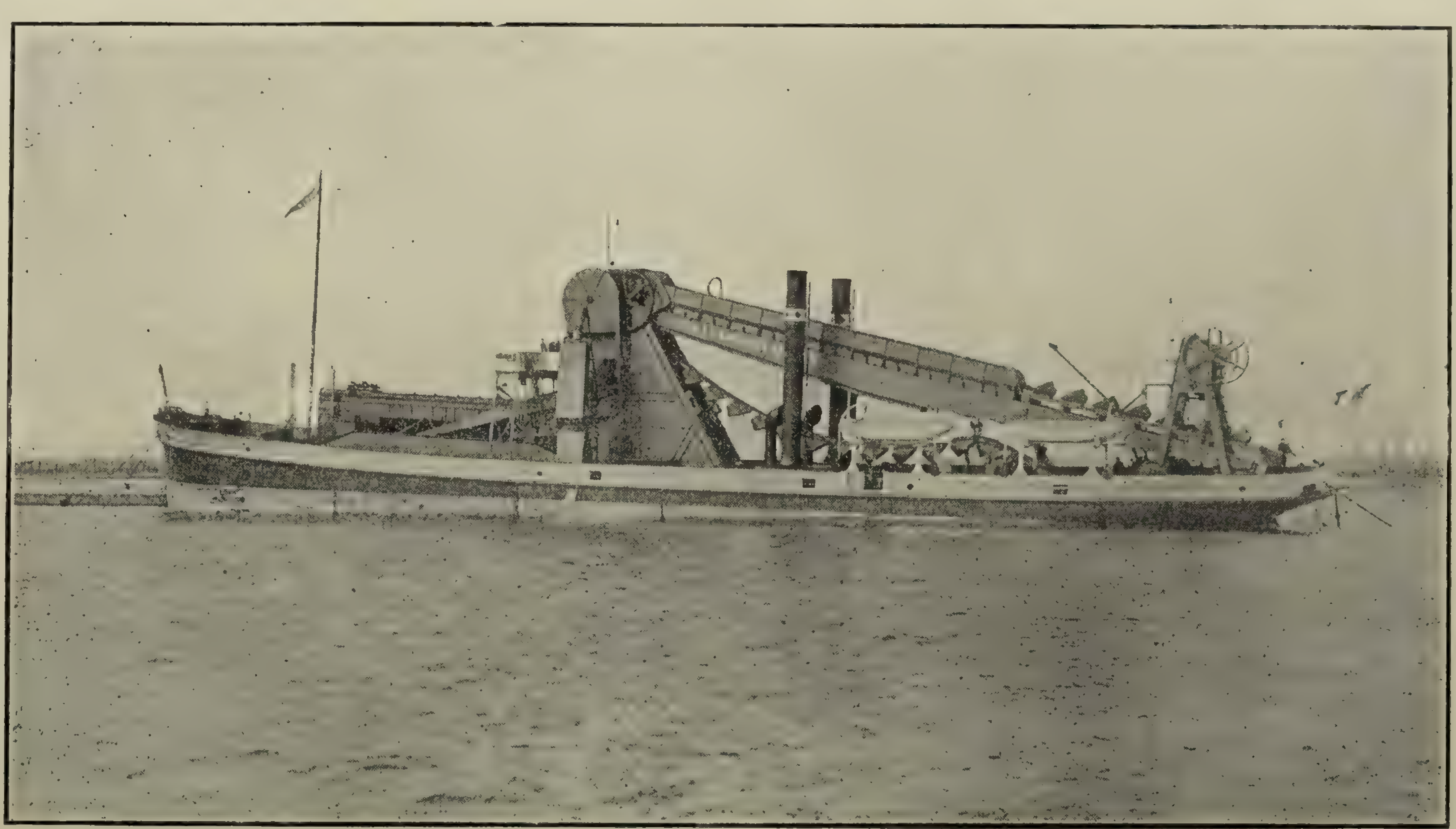
At Amsterdam, the local authorities have built a special quay, 310 meters long, for receiving ores. Formerly, large quantities of ores were carried, from both Rotterdam and Amsterdam, to Germany by rail, but, consequent upon an increase in the railway rates, this means of transport is less employed. Nearly the whole of the enormous quantity of ore is now carried by water.

V. THE MANUFACTURE OF MACHINERY.

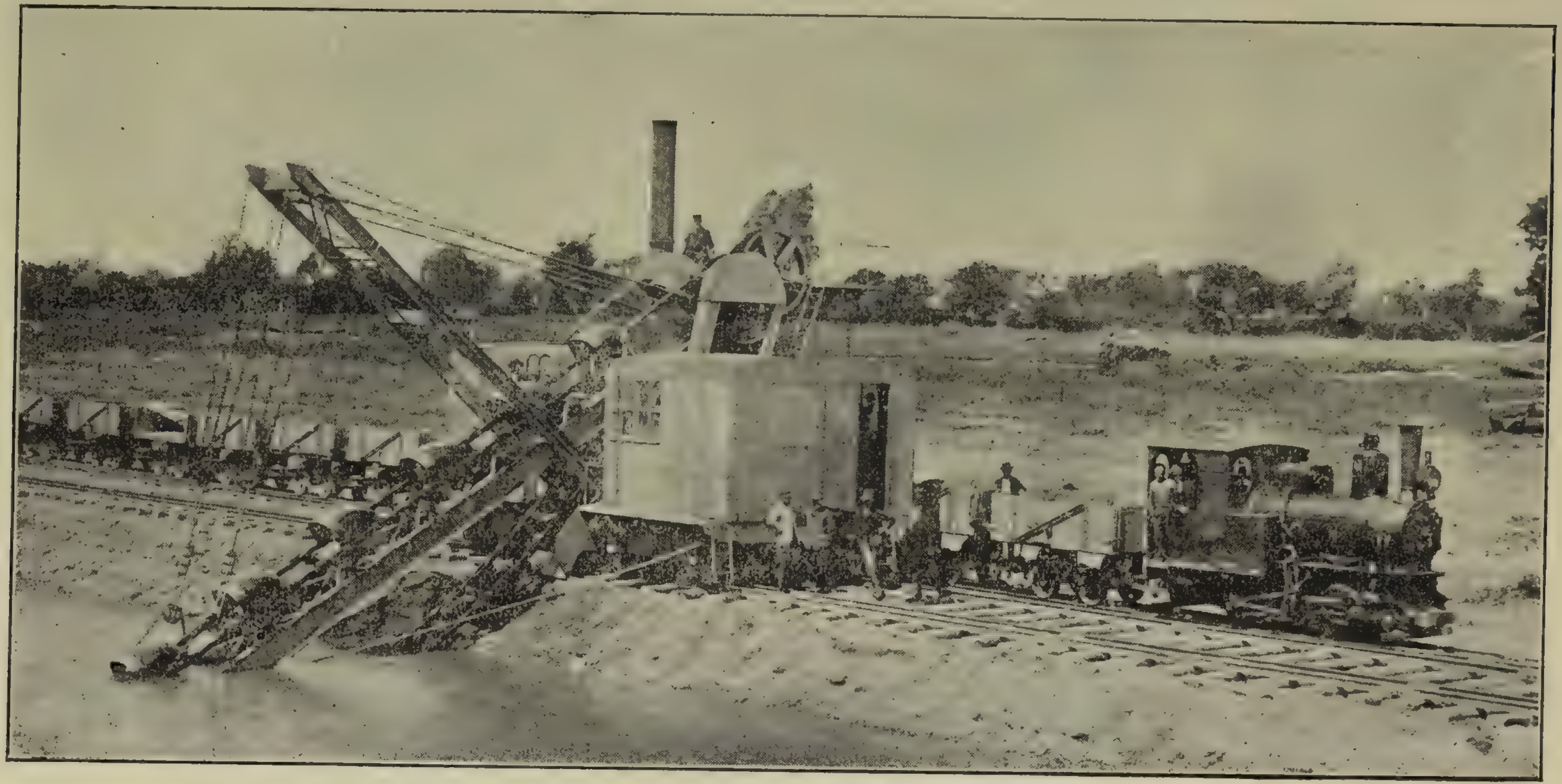
The manufacture of machinery in The Netherlands was not indigenous, but found its origin in the needs of other branches of industry. In the first half of the nineteenth century, the greater part of the machinery required still came from abroad, with the exception of ship's engines which, as early as about 1823, thanks to the encouragement of H. M. King William I., were built in four workshops. The first



View in a manufactory of engine and boiler fittings at Hengelo.



A sea-going dredger, constructed on a wharf at Schiedam.



An excavation engine constructed in a workshop at Haarlem.

of these was the enterprise now known as the Feyenoord Shipbuilding and Engineering Company. Of this enterprise the first director was Röntgen, who invented the receiver compound engine.

If machinery required repairing, this was done by smiths established in the vicinity. In this way, these artisans gradually became practised in the art of engine-building, and one after the other these repairing-shops were transformed into engineering works, which, at first of small importance, gradually extended the field of their labours. Thus it happens that the name of more than one of these Netherlands engineering works, which to-day enjoy so great a reputation, recalls that of its enterprising founder who, without any scientific training and merely by his own practical knowledge, coupled with an invincible tenacity, became, from the simple smith he was, a great manufacturer.

It is in this way that the manufacture of machinery in The Netherlands, adapting itself to the requirements of other trades and influenced by the national industries in general, has developed until it has acquired a commanding position.

It is not easy to write the history of this industry in The Netherlands from statistical returns. Nevertheless, Mr. C. F. Stork, of Hengelo, in the jubilee volume published on the occasion of the fiftieth anniversary of the Royal Institute of Engineers of 1897, made a praiseworthy attempt to set out a list of existing works, with the date of their foundation and the number of hands employed in 1897.

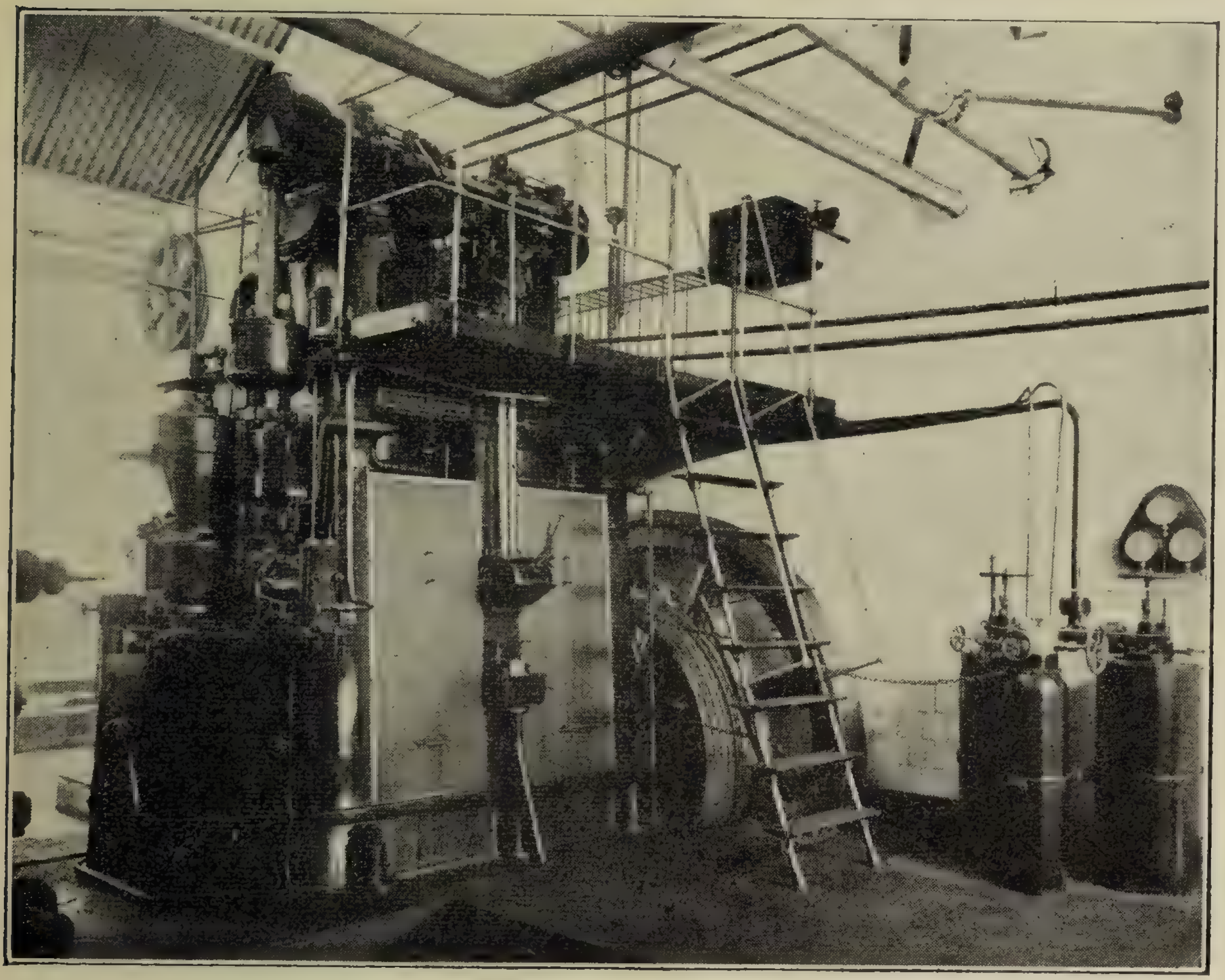
This list includes 40 works, with about 10,000 hands, 17 makers to whom the author applied having sent no reply.

There are now, in the whole kingdom, 212 engineering works giving employment to a rough total of 23,500 hands. Many of them have set up foundries for their own use, and several, at the same time, have added shops for structural works for the building of bridges, light-houses, roofs, etc. Others apply themselves to the production of railway plant, while a certain number of them are at the same time connected with shipbuilding yards.

South Holland contains the largest number of works, with the largest number of workmen; there are about 62, employing about 10,770 hands.

The banks of the Nieuwe Maas and the Noord, between Schiedam, Rotterdam and Dordrecht, may be taken as the principal centre of the engine industry. This industry has been connected with shipbuilding since the commencement of the building of iron vessels and the application of steam to navigation.

In the list of provinces, North Holland comes next, with 32 works and about 4,460 hands. In this province, the manufacture of machinery is mainly concentrated at Amsterdam (where one of the works employs no fewer than 2,500 hands), Alkmaar and Haarlem. We also find important engineering works in most of the provincial capitals and in the industrial centres, such as Twente (for instance, one at Hengelo with 1,150 hands); in the "Groninger Veenkoloniën," or peat



Stationary Gusto Diessel oil engine of 200 B. H. P. installed at Antwerp by a wharf at Schiedam.

Passenger vessel fitted with 3 × 90 B. H. P. marine engine built at Amsterdam.

districts; in the south-west of North Brabant; in the Zaanland, etc. Several works apply themselves particularly to building *ship's engines*, a branch in which, as regards quality, this country is not surpassed by Great Britain; others make the *plant for sugar mills;* others, *machinery for transporting and hoisting loads* and *for moving bridges, lock gates,* etc. A third category devotes itself to the making of *pumps*; a fourth, to the manufacture of quite special *machinery for the removal of earth* (*dredgers, excavators, etc.*); a fifth, to *locomotives* and other *railway plant*; while there are others that supply the necessary *plant for dairies and oil mills, etc., etc.*

In addition to these branches of the machine industry, the number of which is constantly increasing, a great development has been achieved in the construction of *explosion motors* and *international combustion motors*, both for cars and boats (boats driven by petroleum motors are used in The Netherlands more than in any other country) and for supplying the motive power in factories and workshops. There are a number of works, founded specially for this purpose, which find a large market in every country.

We cannot pass over in silence the different branches of the metal trade, which are closely connected with the machine industry (around which they group themselves as auxiliary industries). When the workshops do not possess their own iron and metal foundries, they buy their cast metal from special foundries.

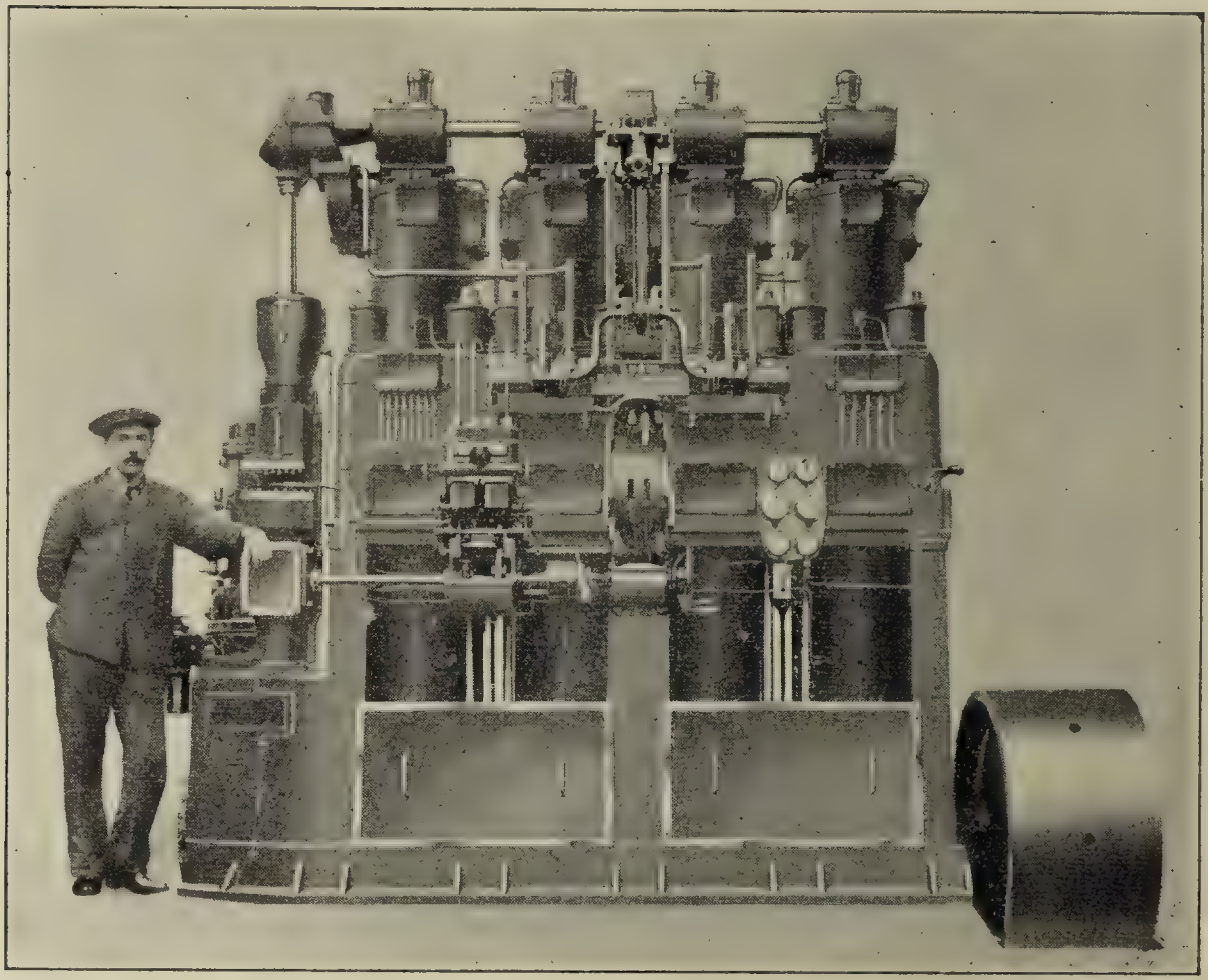
There are also copper, bronze, brass, and lead foundries, etc., and others dealing with amalgams and alloys which are used in the manufacture of a great variety of technical and domestic articles.

As early as 1858, there were 61 metal foundries in existence and, in 1874, 174, most of which were iron foundries. Several of these works applied themselves, sooner or later, to the making of machinery. On the other hand, many engineering works set up foundries of their own.

The most important independent foundries, that is to say, those which do not form part of engineering works, are found among other places at Amsterdam, Bergen-op-Zoom, Breda, Doesburg, Doetinchem, Dordrecht, Epe, Hengelo, Hoogezand, Meppel, Princenhage, Rotterdam, and Tilburg, employing in all about 3,400 hands.

Nearly all the iron, steel and copper required by The Netherlands comes from abroad.

There are some 30 engineering shops which not only make *machinery*, but also *structural work*. Moreover, there are several establishments engaged almost exclusively in this latter branch.



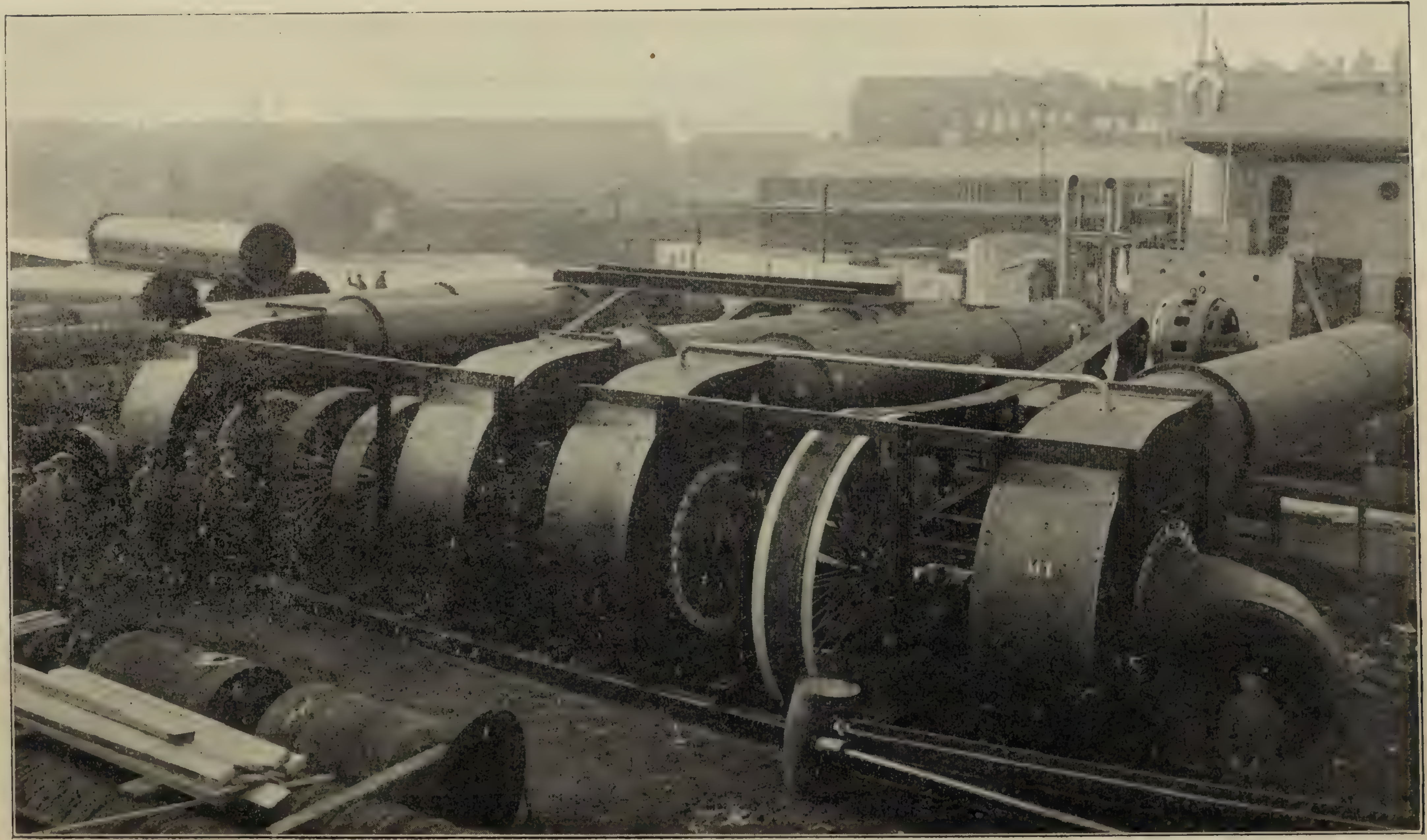
Direct reversible 4-cylinder 2-stroke Gusto Diesel oil engine of 200 B. H. P., marine type, built on a wharf at Schiedam.

But, whether concerned with engineering works or not, these establishments, as such, form a very important branch of the metal industry in The Netherlands. They carry out important orders for the State Engineering Department, the railways, etc., such as the construction of *fixed bridges* and *swing bridges, lock gates, landing stages, viaducts,* *petroleum tanks, lighthouses, gasometers, installations for water supply, roofings, turntables, switches, etc.* These are often made for export to foreign countries and the Netherlands East Indies.

The building of *railway rolling stock* (carriage and trucks) is closely connected with the machine construction industry. This plant is made principally at Amsterdam, Haarlem, Rotterdam, The Hague, Delft, Utrecht and Nymwegen.

Electric cranes on the Ykade at Amsterdam, made in one of the Netherlands engineering-works.

The Amsterdam and Haarlem workshops make railway carriages both for international transport (saloon carriages, carriages for express trains, corridor carriages and ordinary



Installation for draining polders inundated in January, 1916.

Installation for draining polders inundated in January, 1916.

carriages) as well as for the local lines, while those at Rotterdam and The Hague work more especially for the tramways.

The Nymwegen, Delft and Utrecht works make principally goods vans, trucks and cattle trucks. At Amsterdam and Rotterdam, there are further works engaged in making material for narrow-gauge lines (Decauville's system), which also supply rails, switches, etc., for contractors, factories, etc.

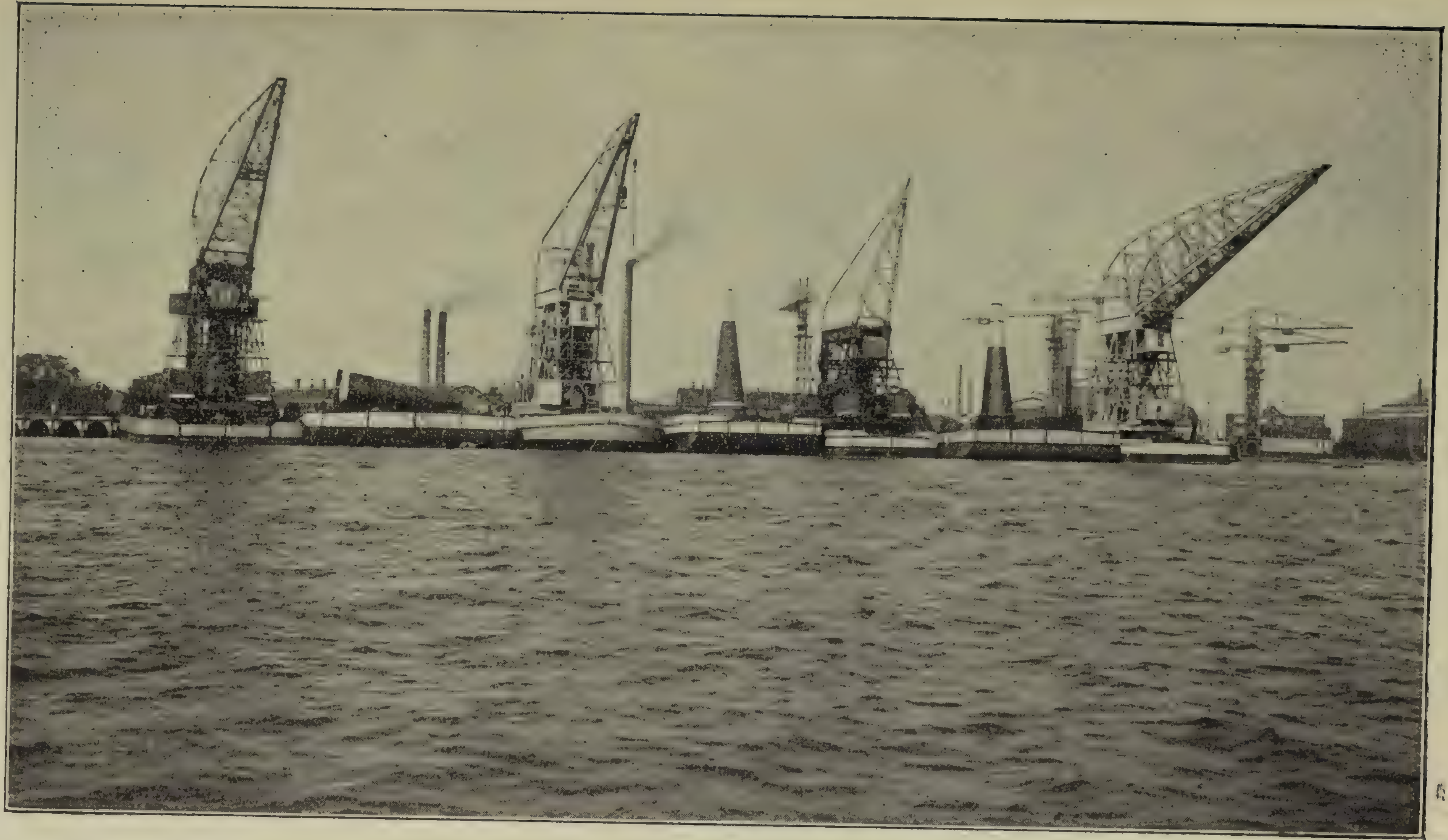
Among the most important auxiliary industries connected with the machinery trade are to be mentioned the making of engine and boiler fittings and of those used in the electrotechnical industry.

The latter may be divided into two sections: the one engaged in the manufacture of *electric motors*, *dynamos*, *converters* and *accumulators*, etc., and the other more particularly producing *electric apparatus*, *technical* and *scientific instruments* and *instruments for domestic use*, such as *carburetters*, *measuring instruments*, *telephones*, *Röntgen Ray apparatus*, *electric time-pieces, incandescent lamps* and similar articles. These two sections are represented in The Netherlands and have developed there (especially with regard to certain details) since the use of electricity, both in town and country, for lighting purposes and motive power has become fairly general. There are in The Netherlands about 50 electricity supply works of some importance.

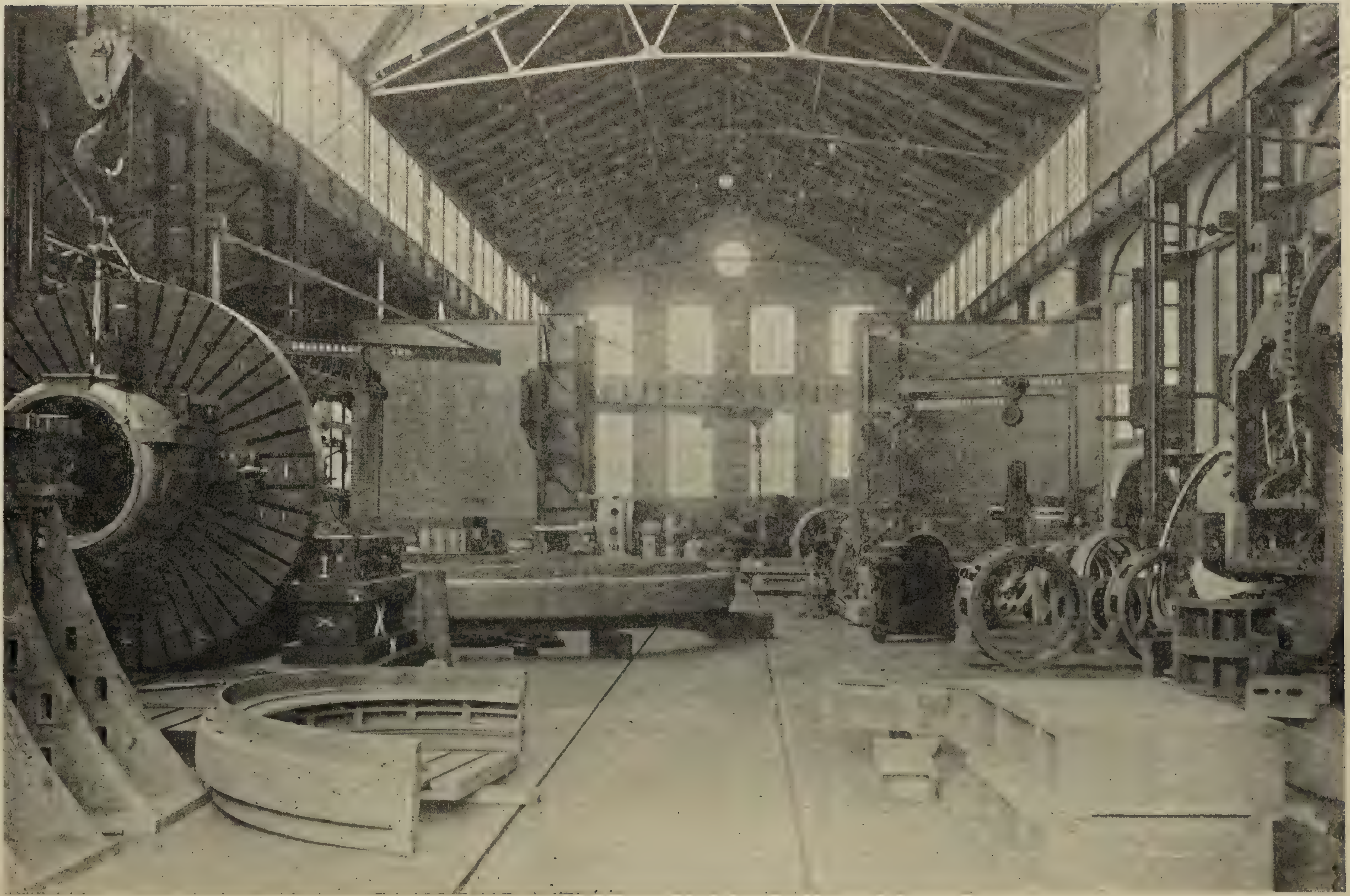
Dynamos and electric motors are made at Slikkerveer, near Rotterdam, and at Dordrecht. Works engaged especially in the manufacture of electrical apparatus are found, among other places, at Hengelo, Utrecht, Gilze and Ryen, Rotterdam and Maarsen.

There are 10 establishments in The Netherlands engaged in the manufacture of metallic filament lamps, carbon filament lamps and arc-lamps, among others, one at Eindhoven employing about 3,500 hands. The others are at Venlo (with about 350 hands) Boxtel, Bois-le-Duc, Tilburg, Vaals, Amsterdam, Rotterdam and Nymwegen.

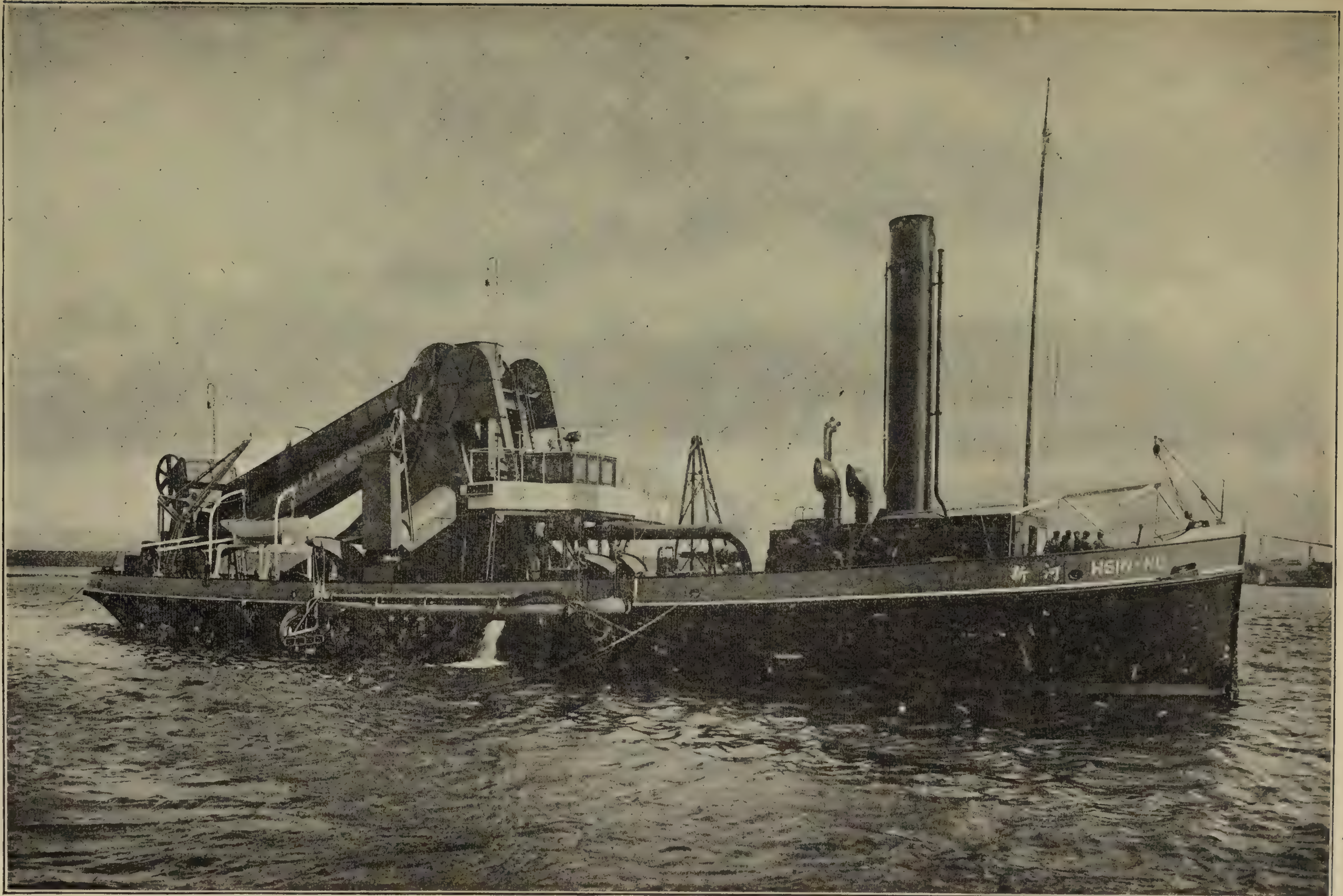
The manufacture of electric filament lamps is still a young industry, but one which has quickly become prosperous. These goods, which meet with great favour, find a market all over the world, especially in Great Britain,



Seven derricking and revolving floating cranes, having a lifting power of from 100—200 tons,
built on a Netherlands warf at Schiedam.



View of the fitting-shop in one of the Netherlands electro-technical works.



Sea-going twin-screw bucket dredger "Hsin-Ho," built on a Netherlands wharf at Schiedam for the Hai-Ho Conservancy.

Denmark, Germany, Russia, Sweden, Norway, France, Belgium, Switzerland, Italy and many countries overseas. A manufactory of brass fittings for incandescent lamps at Middelburg, employing about 400 hands, likewise deserves attention. These goods are sold to nearly all the manufactories of incandescent lamps.

There is an *arc-light works* at Vaals, in Limburg, and *cable works* at Amsterdam and Delft. This newly-established industry works with great success and produces every sort of cables, both for telephones and bells and for submarine purposes.

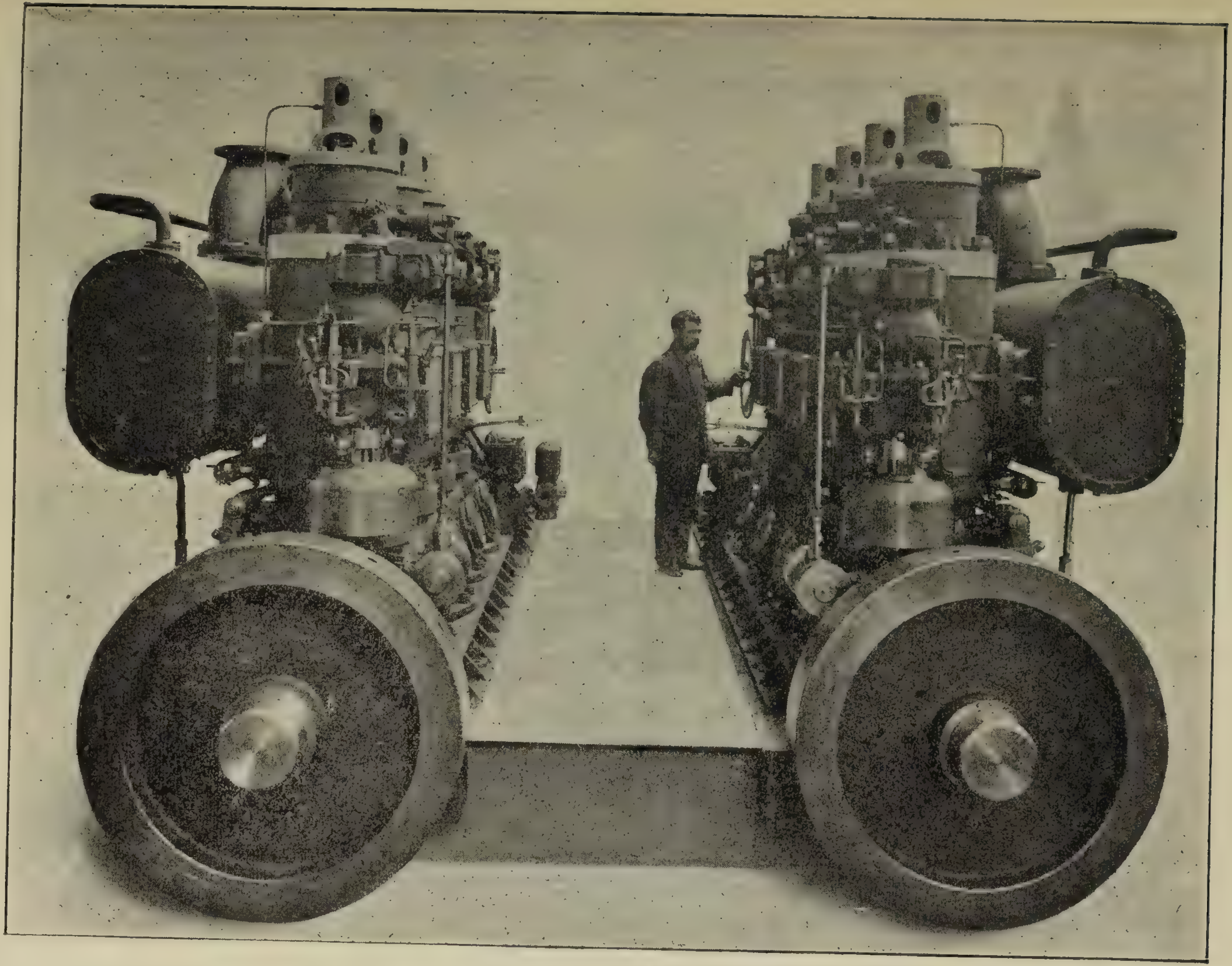
Hengelo has an important establishment specially engaged in the manufacture of engine and boiler fittings (taps, valves, etc.).

Bolts and nuts of every description, screws, rivets and every kind of railway, tramway and fence fastening are likewise manufactured wholesale by several perfectly-equipped establishments, which count among their regular customers the Government, the contractors, the railway companies, the engineering and structural works and the shipyards. Always using the latest inventions and having a large selection to offer, these firms also export a great deal to, among other countries, Great Britain, the Netherlands Indies, Africa, etc.

Some of these works make more especially the heavy material used in the building of engines, bridges, ships, railways, etc., as also the iron-work for telegraphs and telephones, while others specialize in less heavy material in steel and copper, intended for the manufacture of motor-cars, bicycles, instruments, lighting apparatus, etc.

Although this sketch is scarcely complete, it proves sufficiently that the machinery trade, as well as the industry connected therewith (in themselves important for a country which is obliged to go abroad for most of its raw materials) have largely developed in The Netherlands and, especially in the last few years, have achieved success in entirely new fields.

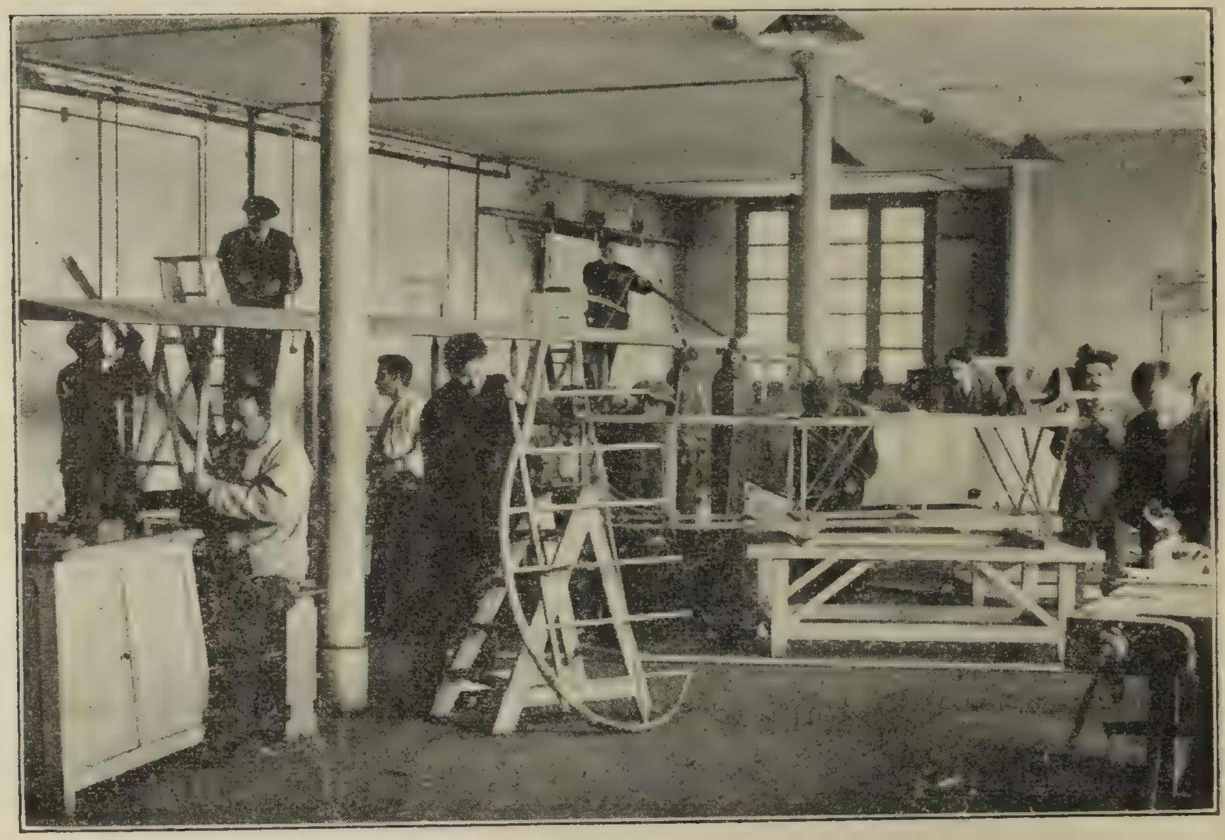
The works engaged in making dredging material in particular have gained a world-wide reputation. The development of this branch of industry is due in the first instance



Twin screw installation of 2 × 275 B. H. P. for motor-tankship, built in a factory at Amsterdam.

to the activity of the Netherlands contractors for large works, who found a field for their enterprise in nearly all countries. Their using of Netherlands material stimulated the industry, and now the products of this industry are appreciated as being the best of their kind, which is proved by orders from different foreign governments, harbour authorities and others.

Machinery for sugar mills is also largely exported to the Netherlands Indies and to South America; machinery for margarine factories to all the countries of the world; brick-making plant to Belgium, Germany and Russia; cranes to Belgium; machine tools for working sheet iron to the Netherlands Indies, Germany and Belgium; pumps to Italy; whilst explosion and internal combustion motors find a market in every country under the sun.



View in the mounting-room of an aeroplane factory at Amsterdam.

A few years ago an aeroplane factory was established at Soest, which works principally for the Army. Aeroplanes are also now being built at Amsterdam.

In truth, during the last ten years, the Netherlands machinery trade has been able to face foreign competition in various fields, and that not only in the country itself, but also in the Colonies and abroad.

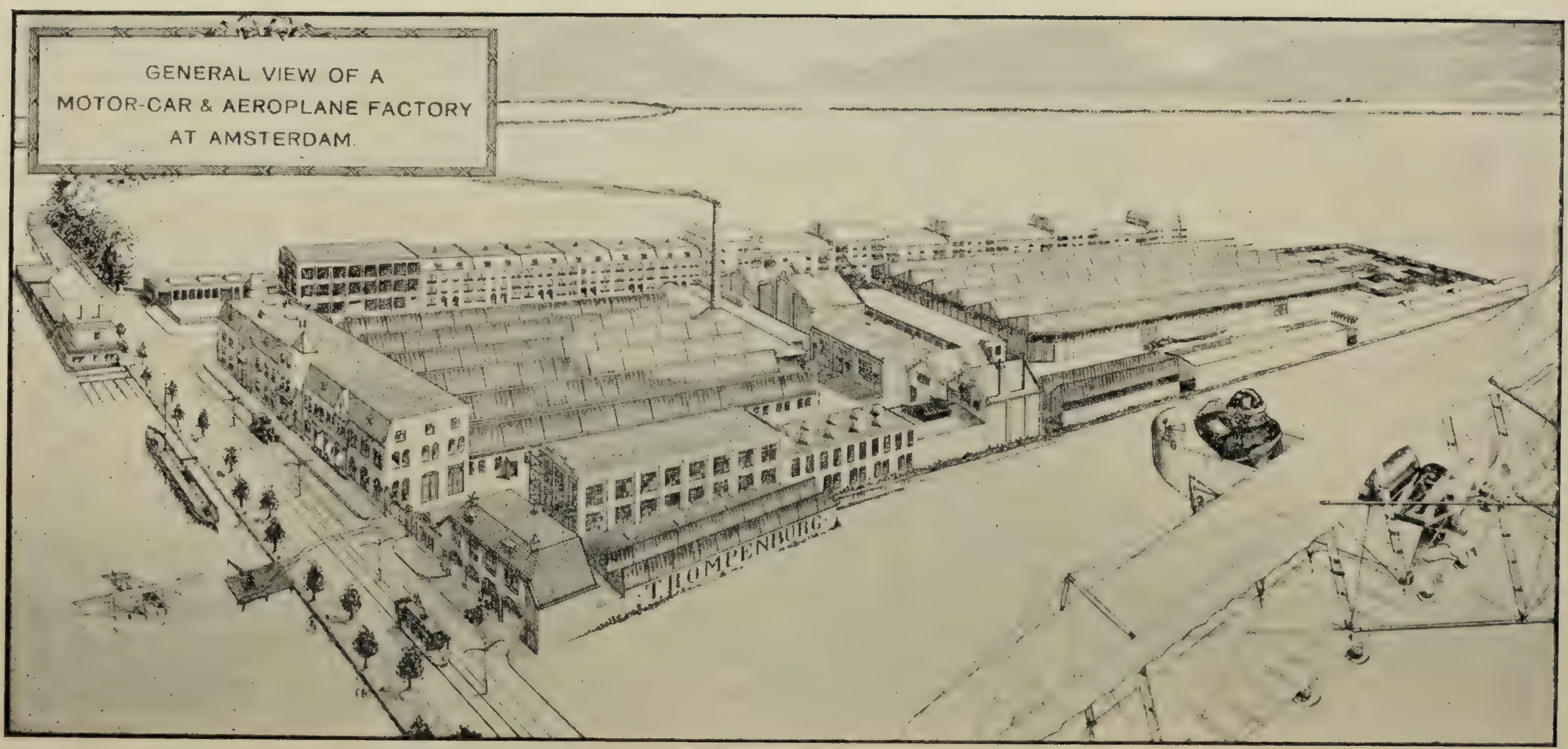
As an example of the all-round capacity of one of the engineering establishments of The Netherlands, a couple of illustrations are given (pp. 34 & 35), representing the pumping plant, designed and built by the Nederl. Fabr. van Werktuigen en Spoorwegmaterieel, known as the "Werkspoor," of Amsterdam, for the purpose of draining the provinces of Holland which were inundated by the sea after the terrific storm that destroyed the dikes at several points of the Zuyder Zee shore on Jan. 14th, 1916. The installation is shown here as it was being erected at the shops, and shipped, in order to be installed on the dikes. The installation consists of 8 centrifugal pumps in 4 groups of 2 pumps, each group being belt-driven by an electric motor. The plant has a total capacity of 1,600 cubic Meters or 350,000 gallons per minute, and has been completed, inclusive of about 1,600 feet of suction and delivery pipes, in the remarkably short time of 3 weeks. It is calculated that, with the aid of this plant the flooded country of more than 32,000 acres can be drained in about four weeks.

VI. SHIPBUILDING.

Shipbuilding is the oldest industry in The Netherlands. Its origin dates from the time of the first inhabitants of the coast and, together with fishing, it has created the resources required for the economic development of the nation.

Throughout the history of Netherlands industry, shipbuilding has played an important part, especially in the days of prosperity and power of the seventeenth century, when the Republic of the United Provinces was the hub of the world's trade and almost the only country in Europe engaged in maritime transport.

According to Hugo Grotius, the number of vessels built every year in the Netherlands yards amounted to over 2,000. Many of these were built for other nations.



GENERAL VIEW OF A
MOTOR-CAR & AEROPLANE FACTORY
AT AMSTERDAM.

It is well known that the reputation of the shipbuilding yards established on the banks of the Zaan, the river alongside which this industry was then concentrated, attracted Czar Peter the Great to Zaandam for the purpose of studying the art of shipbuilding.

In the second half of the eighteenth century this industry fell off, as did many others. In the reign of King William I., several attempts were made by bounties and other similar means to revive the trade: and not without success. In 1819 there were 380 shipyards; in 1858 there were 642.

When iron and steel, however, had taken the place of wood as the staple material in the building of ships, and when paddles and propellers worked by steam had been substituted for sails, a complete alteration took place in this industry. Now shipbuilding is once more prospering in The Netherlands.

The first iron merchant vessel launched in this country was *De Industrie*, built at the "Kinderdijk" by Mr. Fop Smit, a renowned master shipwright and the ancestor of a large family which occupies an honourable place among Netherlands shipbuilders and shipowners. The first iron sea-going steamers built for the Government and christened *Hecla* and *Etna* were launched, in 1837, at the yards of the "Nederlandsche Stoomboot-Maatschappij" (Netherlands Steamboat Co.) at Rotterdam.

Soon after, the first iron river steamers followed. They were built in Fop Smit's yard at the "Kinderdijk," which was the first of a great many important shipyards on the Maas and the Noord.

It was only after 1875 that the building of iron steamships increased in The Netherlands, causing a gradual decrease in the building of sailing vessels and a transplanting of the industry. In South Holland, the number of shipyards slightly decreased after 1875, several owners who could not make up their minds to build iron vessels having closed their establishments. Those who remained expanded and increased their output.

Instead of the 609 yards in 1874, there are to-day only

General view of a shipbuilding yard at Amsterdam.

236 both for sea-going vessels and river boats, employing about 21,500 hands. Some of the shipyards are at the same time engineering works.

Of these establishments, there are 37 in Groningen, 16 in Friesland, 3 in Drenthe, 12 in Overyssel, 15 in Gelderland, 7 in Utrecht, 37 in North Holland, 93 in South Holland, 4 in Zeeland, 11 in Brabant and 1 in Limburg.

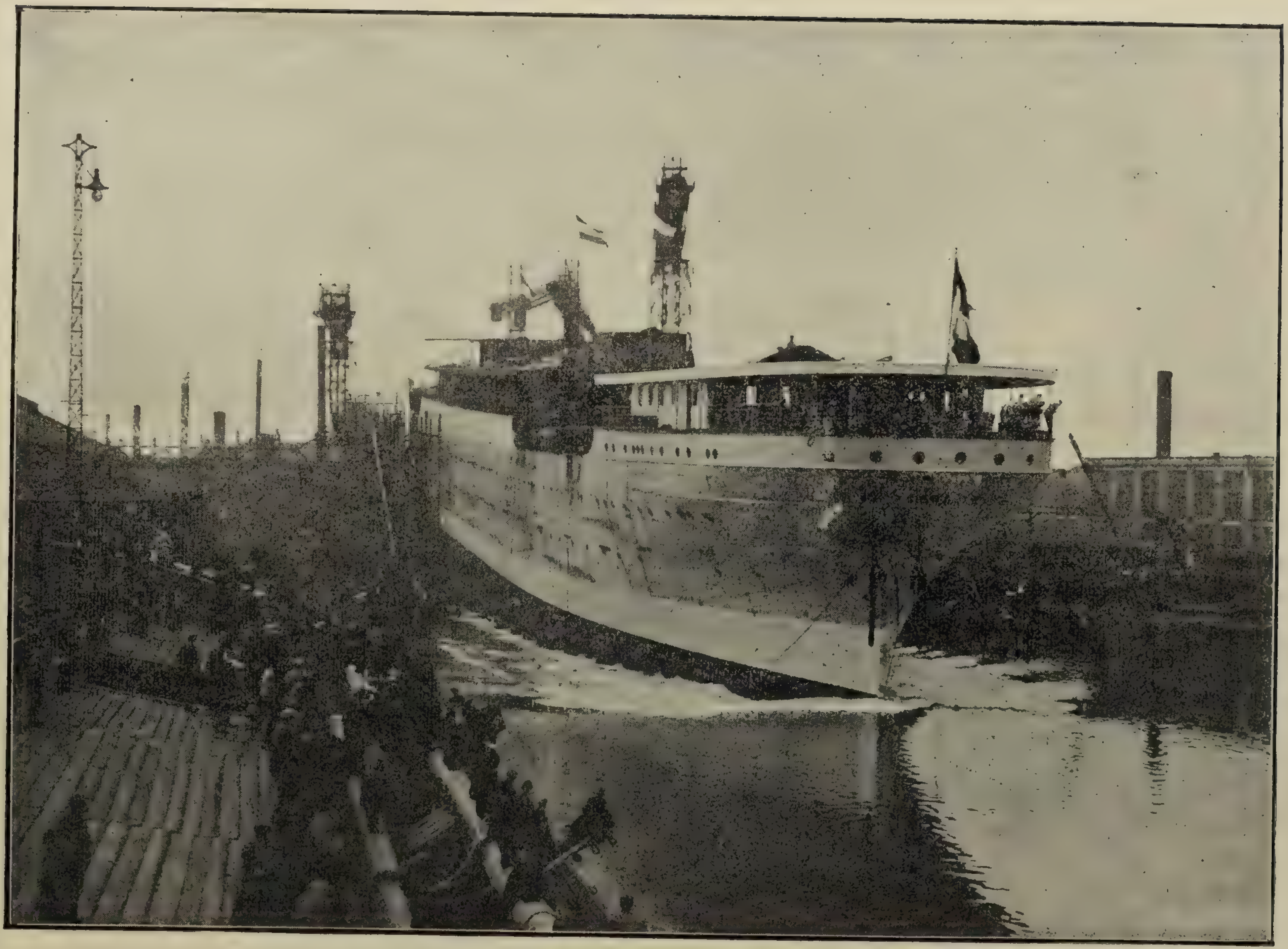
Shipbuilding is centred principally near the large towns (Amsterdam, Rotterdam, Haarlem, Dordrecht) and on the banks of the Maas, the Noord and the Lower Merwede. There are over 30 important shipyards, at short distances from one another, along the banks of the river that forms the great way of communication with Germany and Belgium.

A few figures may give an idea of the importance of shipbuilding in The Netherlands. In 1913, there were built 1,087 vessels for sea and river navigation, as against 724 in 1908. Out of the total for 1913, there were 132 sea-going vessels, whose total tonnage amounted to about 100,000 tons.

In 1913 the engineering works delivered 298 ship's engines of 121,331 i. h. p. and 396 boilers. In the same year different yards carried out orders for 13 different countries (exclusive of the Netherlands Colonies) namely, Germany, Belgium, Great Britain, Italy, France, Russia, Denmark, Norway, Austria, the Argentine Republic, Brazil, Chili and Egypt, both for sea and river navigation.

As regards the building of *liners* and *men-of-war* (ironclads, torpedo-boats, etc.), The Netherlands have also made great strides thanks especially to the capacity of their engineers and of the heads of the great firms, whose establishments are fitted up with all the latest improvements.

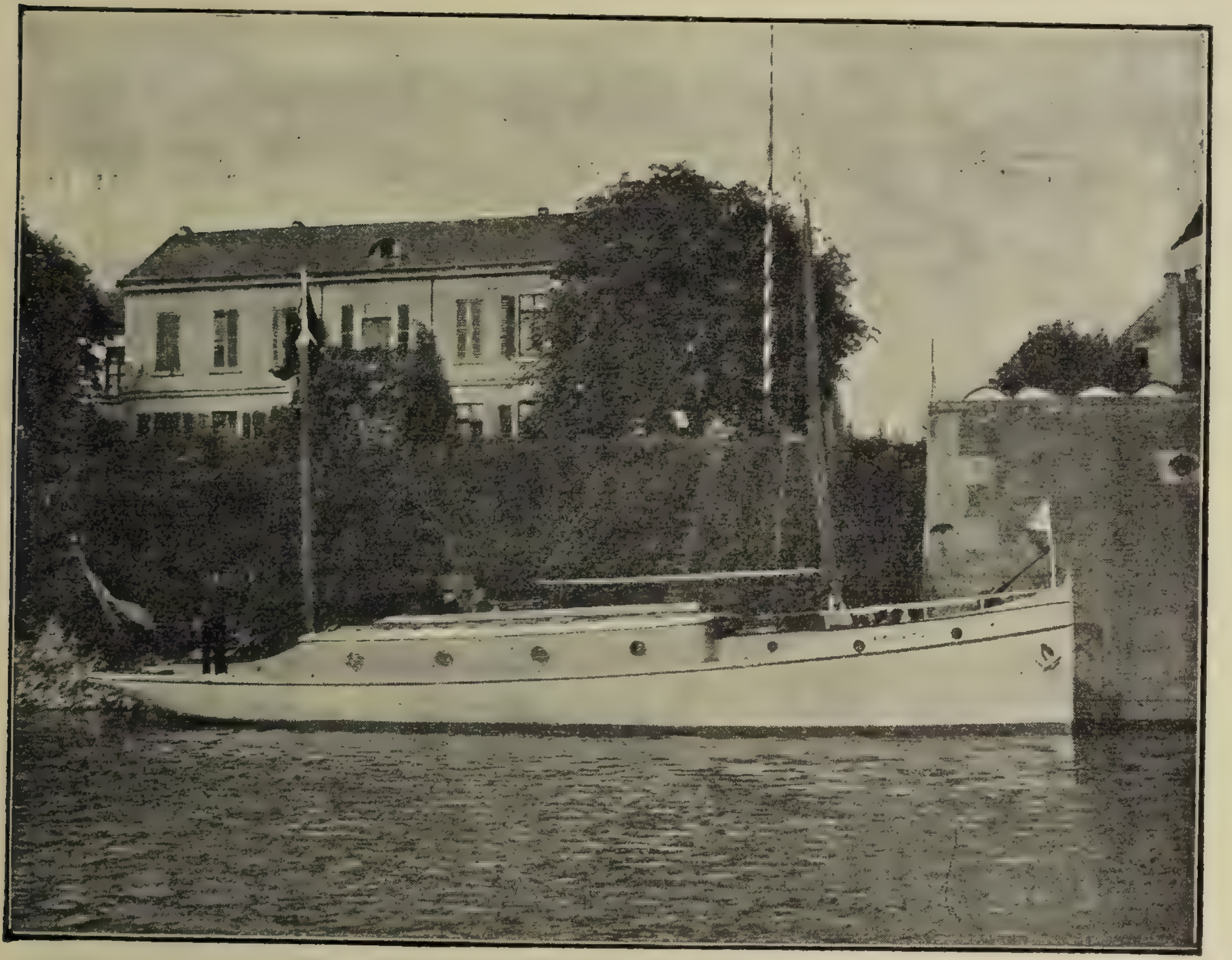
Although the larger vessels for the Royal Navy, such as ironclads, etc., are nearly all built in the State yards at Amsterdam, the torpedo-boats, dispatch boats, pilot boats, etc., are frequently supplied by the large private yards established at Amsterdam, Flushing and Rotterdam. The Flushing yard also built the first submarine for the Netherland Royal Navy. These three yards are also very successful with their work for the big shipping lines, such as the Netherlands Navigation Company, the Rotterdam Lloyd,



Launching the packet-boat “Frisia”, built on a Netherlands wharf at Flushing.

the Royal Holland Lloyd, the Royal Netherlands West India Mail, the Java-China-Japan Line and the Royal Packet Company, which now give their orders almost entirely to the home industry and are supplied to their entire satisfaction, although their requirements are very severe, owing to the keen competition of foreign lines.

Another branch of shipbuilding that has developed greatly in The Netherlands is the building of *dredgers, suction dredgers, mud barges* and accessories for the removal of earth, such as *tippers, hoppers*, etc.



The motor launch "Kromhout", winner in many international competitions.

It is to the numerous large contractors for public works that the country owes its foreign reputation in this line, which has become a characteristic industry of The Netherlands, as is proved by many important yards. The floating or selfpropelled machinery for the removal of soil has been delivered all over the world, by our national yards, for some decades past. And, in this way, the importance of the business increases yearly, the energetic master builders always taking care to make use of the latest inventions of technical science.

Another industry in which The Netherlands occupies a position of honour is the building of *motor-boats*.

These boats or launches of various tonnage, built for diverse purposes, are supplied to countries all over the world by certain Netherlands yards possessing special plant. Some make the motors as well as the boats, others only the boats.

The Netherlands and England are rivals for the first place as regards the application of *internal combustion engines* (that is, engines without boilers) to small boats and fishing smacks. As regards the application of oil engines to large sea-going vessels, The Netherlands were first in the field, the tank-steamer *Vulcanus*, fitted with Diesel oil motors, built in a Netherlands shipbuilding yard and launched in 1910, being the first ship of such dimensions to be fitted with that kind of engines.

The yards working specially for river work build *passenger boats*, *cargo boats*, *tugs*, and *flat-bottomed boats* for the Rhine and other rivers, chiefly for German shipowners. Thus the greater part of the freight boats (barges) that ply the Rhine between Rotterdam and Mannheim are built in The Netherlands. These boats are now of imposing dimensions and of corresponding tonnage.

The building of tug-boats is a similar industry. Among the large fleet of fast and powerful steamers launched yearly in The Netherlands, principally for the navigation of the Rhine, every type is represented: screw tugs and paddle tugs, tugs for tidal river and harbour traffic, and tugs built for transatlantic voyages.

Another speciality of Netherlands shipbuilding is represented by the large saloon paddle-steamers with a light draught, which allows navigation on the rivers. These steamers are built for great speed. This industry enjoys so great a reputation to-day that many foreign shipowners have their boats built in The Netherlands.

It is difficult to collect data concerning the building of wooden fishing smacks, river boats and pleasure craft, but in every part of our country where water exists, these are still built in more or less large yards according to the traditional models.

The many foreigners who have visited Friesland have noticed that most of the handsome yachts and solid sloops are made in that remarkable province, the large lakes of which are admirably adapted to aquatic sports.

VII. THE METAL INDUSTRY.

Apart from the manufacture of machinery, the various allied industries and shipbuilding, other branches of the metal industry have developed in The Netherlands during the nineteenth century.

Most of them have grown out of the handicrafts which, down to the middle of the nineteenth century, were still exercised in a very primitive manner, the artisans confining themselves to the fashioning by hand of materials already partly worked, in order to produce articles of everyday necessity on the spot.

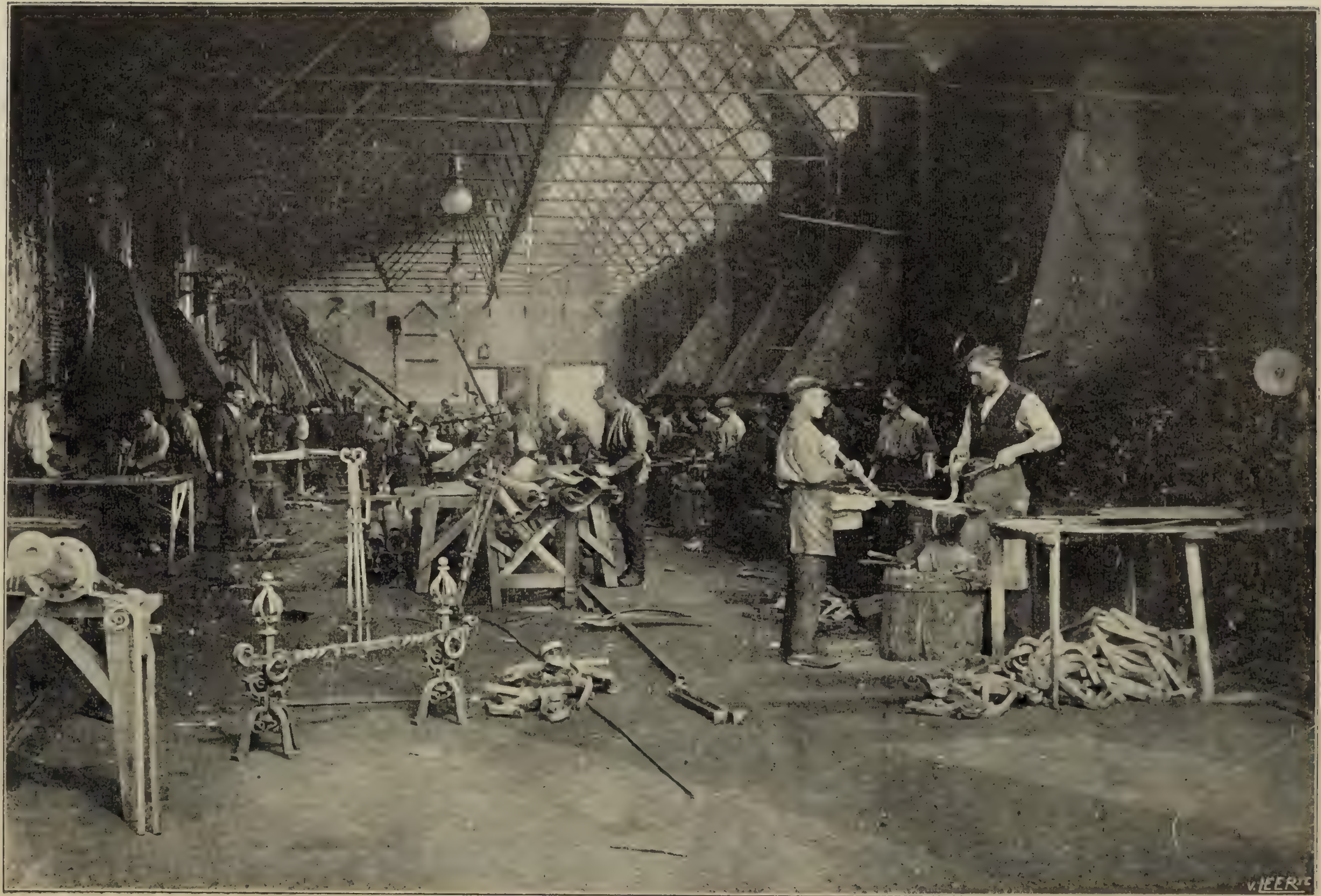
An exhaustive account of what The Netherlands possess and produce in this department since the beginning of the twentieth century is more than can be expected within the limits of this brochure.

Under the first heading come all the trades concerned with the manufacture of *small iron objects.*

Although hand labour still plays an important part in this department and machinery is only, in most cases, employed to finish the hand work, a good number of articles of iron and steel for daily use are here manufactured, some of them on a large scale, while of others the production is beginning to develop.

We give below a short sketch of those factories which devote themselves exclusively to the manufacture of these articles, or at least make a special feature of them.

Iron bedsteads are made in factories at Amsterdam, Deventer, Maastricht, Utrecht and Veenendaal. The factories at Utrecht also turn out perambulators, invalid chairs,



View of an art iron foundry at Rotterdam.

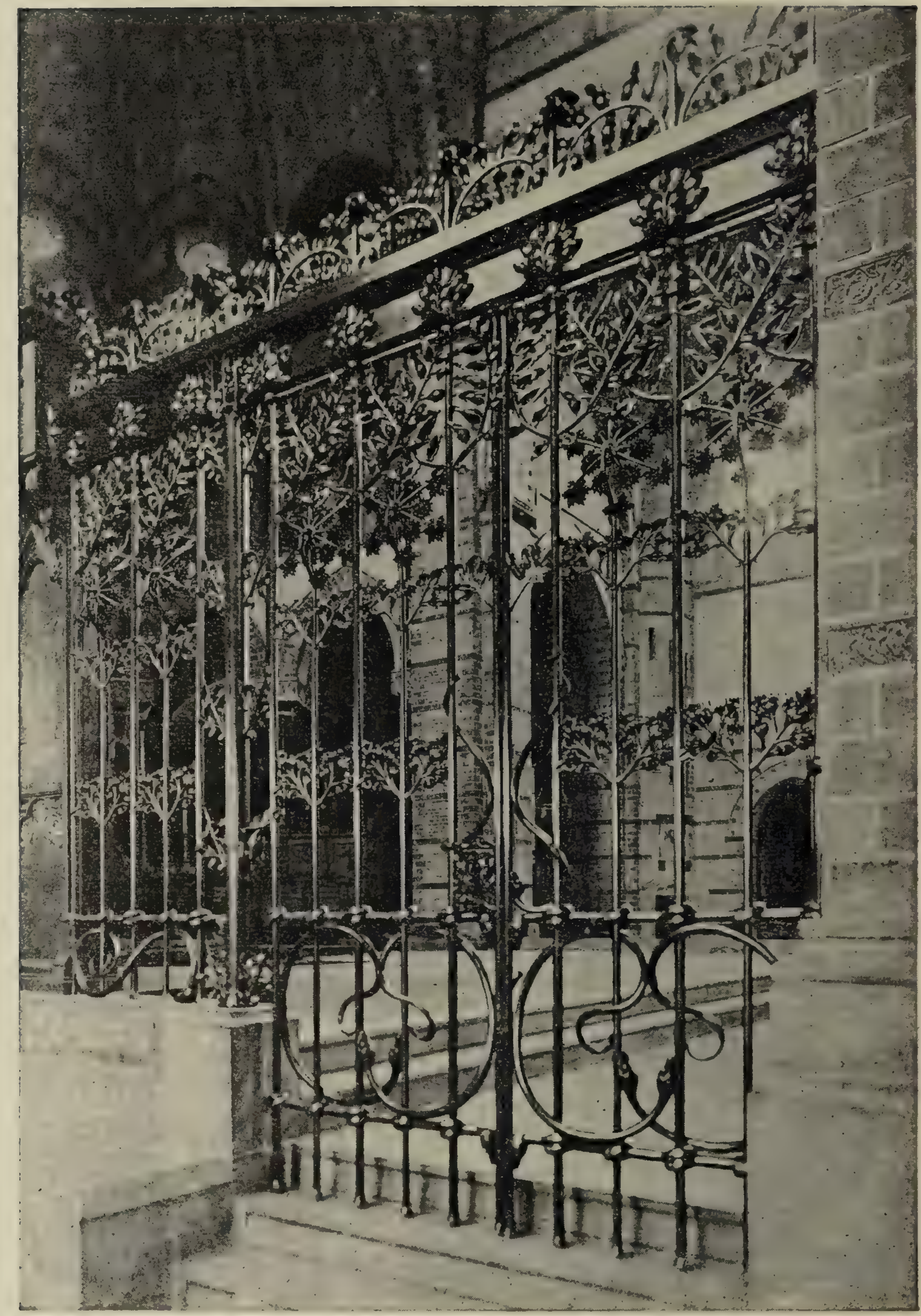
&c.; those at Deventer make a speciality of wire mattresses. *Garden furniture* is turned out by the aforesaid factories of iron bedsteads at Amsterdam, Deventer and Maastricht and also at The Hague, Rotterdam and Weert. Six factories, notably at Amsterdam, Breda, Purmerend and Rotterdam, manufacture *refrigerators* and other apparatus of the same kind. In The Netherlands, the manufacture of arms is not a very extensive one. There are *arms factories* at Zaandam, Delft, The Hague and Roermond. On the other hand, there are important *file manufactories* and *file-cutting works* at Amsterdam, Delft, Deventer, Rotterdam, Ryswyk and Utrecht, as well as manufactories of *tin-tacks*, *nails*, *drawn wire*, &c., giving work to numerous labourers, at Beek-and-Donk, Helmond and Maastricht. These last three factories employ a total of about 950 workmen. They sell their products abroad as well as in The Netherlands themselves. *Steel cables* are made at Gorinchem and Rotterdam. *Skates* are and have, from an early date, been made principally in the province of Friesland, especially at Bolsward, Heeg, Ylst, Warga, Akkrum, Hommerts and Oosterlittens. They are exported to Germany, Great Britain, Austria, Russia and the United States, where Netherlands skates are in great request. Outside Friesland, skates are made by machinery at Utrecht and at Den Ham (Groningen).

The manufacture of separate pieces for garden and agricultural tools, such as *spades, hoes, rakes,* &c., is on the increase in The Netherlands nowadays.

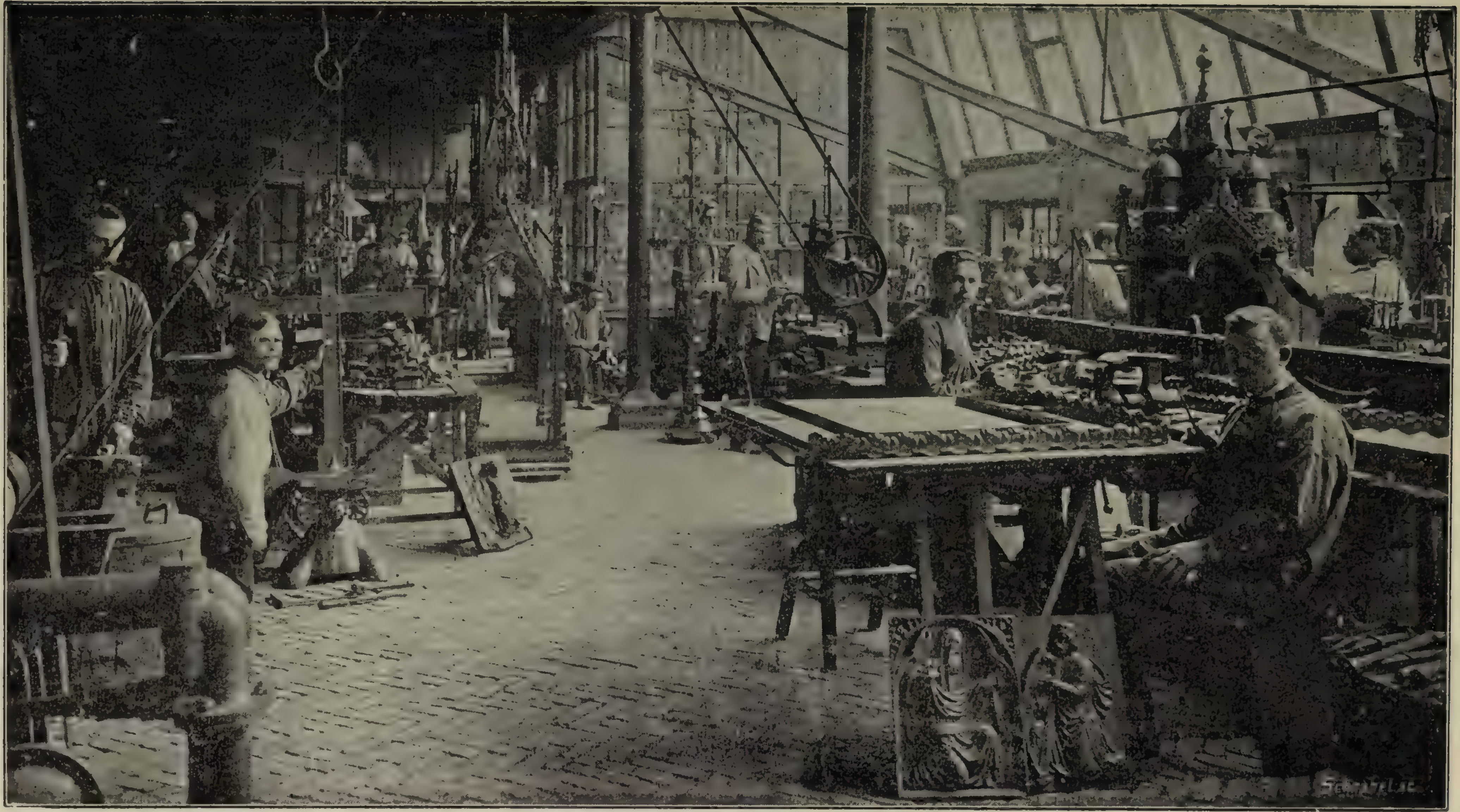
This industry, to which a good number of blacksmiths have devoted themselves, especially in the north and in the "Westland," is steadily developing and successfully holding its own against foreign competition.

At Dordrecht, Helpman near Groningen, Oosterhout, Tilburg and Utrecht, *horse-shoes* are manufactured by machinery. One hears nothing but praise of this last-named article.

Several ironware factories and small forges manufacture, with success, such articles as *plain agricultural implements, haymaking tools and accessories, dairy implements*, &c.



Part of the bronze choir fence in the Cathedral at Haarlem, constructed in an art workshop at Utrecht.



View of the copper workroom in an art workshop at Utrecht.

In particular attention may be called to the *meat-cutting machines* which are manufactured in a special factory at Rotterdam, employing about 230 hands and doing a big trade with foreign countries (it works the VAN BERKEL patent), and in a bicycle works at Deventer. Manufactories of *ironing and glazing machines* for laundries exist at Rotterdam and Delft. At Amsterdam, Leur, Teteringen and Weert, they make *scales* and *large weighing-machines* (for cattle, &c.).

Over and above these trades, which work principally in steel and iron, there is the no less important group of trades concerned with *copper and its alloys*. Copper and brass are used in The Netherlands both for making the requisite accessories for other branches of the metal industry and for the manufacture of finished articles for technical purposes, domestic use or decoration (pans for sugar works, kettles, building accessories, pipes, handles, door knobs, candelabra, vases, lamps, &c.). Among the various branches of the copper trade, namely, *rolling*, *foundry work*, *coppersmith's work* and *trimming*, the first-named is represented in this country by one important factory, at Apeldoorn, which is worked by steam and by water.

The establishments in which copper-casting forms the principal occupation are more numerous, though most of the building works in The Netherlands themselves cast the copper which they require.

There are important *copper foundries* at Hengelo (employing about 350 hands), at Nymwegen and at Ysselmonde (where they make screws for metal-work, bolts and screw nuts, all finished, and jointings for lighting apparatus), at Utrecht (where one factory has made a special feature of door handles, lanterns, fittings, &c. for railway carriages and tramcars, motor-cars, &c., while another devotes itself rather to the casting of large pieces for domestic utensils, which are fashioned and finished in other factories), at Amsterdam, Arnhem, Deventer, Haarlem, The Hague and Rotterdam (where they make lighting apparatus, in bronze or copper), without including two factories at Amsterdam, which specialize in copper objects for technical uses, and at Dordrecht,

View in an art workshop at Utrecht.

Gorinchem, Roosendaal, Rotterdam, Slikkerveer, Ysselmonde and Zeist.

The establishments for the production of works of art in copper occupy a special and honourable place in the Netherlands copper industry. At many places, especially at Amsterdam and The Hague, there are works of minor importance; but the large manufactories and workshops which produce articles for export as well as for the native market are at Utrecht (a workshop for church ornaments, which produces chased copper articles in addition to goldsmith and silversmith's work), Roermond and Tilburg.

It is difficult to draw a distinction between the industry in copper and that in the other metals and alloys, most of the copper foundries being also hardware factories, which produce articles in copper as well as in nickelled copper, bronze, tin, iron, galvanized iron (milk-cans), etc.

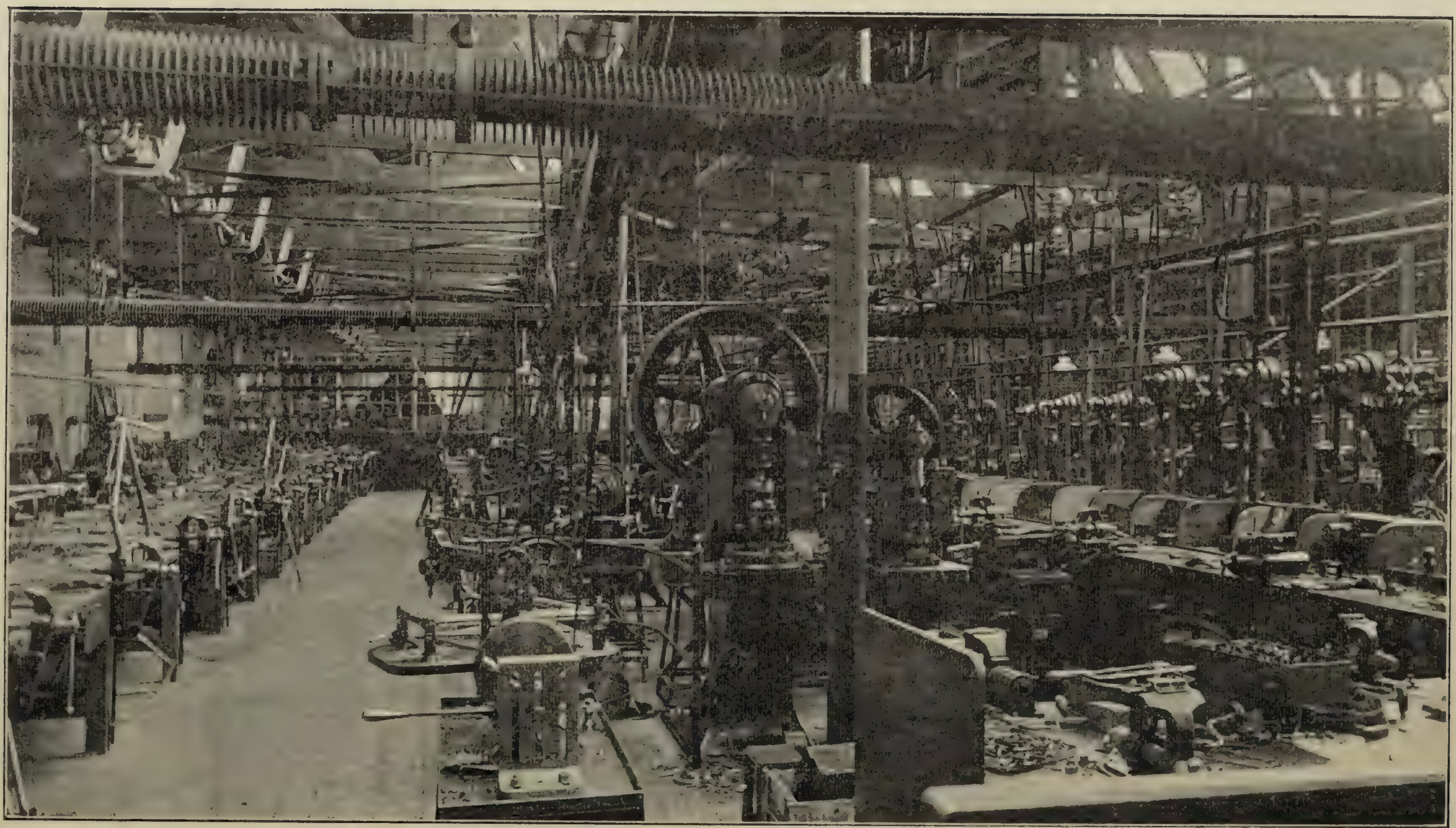
These factories do business (outside The Netherlands and her Colonies) with Belgium, Denmark, Germany, France, Great Britain, Canada, Egypt and the United States of America.

The ironmongery works are often in their turn combined with *nickeling*, *gilding*, *silvering* and *coppering works.* Some of these latter, however, are independent; there are some, for instance, at Amsterdam, Dordrecht, Groningen, The Hague, Haskerland, Nymwegen, Nieuwe Pekela, Rotterdam, Schoterland, Utrecht and Zaandyk, employing 450 hands in all.

Besides iron and copper, *lead* and *zinc* are also worked in The Netherlands.

At Budel (North Brabant), in particular, there is a large, very remarkable works, employing about 820 hands, in which zinc ore from different countries, as, for instance, Canada and Australia, is smelted. Bois-le-Duc, Ryswyk, Rotterdam and Utrecht boast important *lead-rolling mills*, which also manufacture pipes made of special amalgams, pewter pipes and pipes with zinc coatings. The Utrecht factory is also an important *zinc rolling mill.* It has remained the only one of its kind in The Netherlands since its foundation, about 40 years ago, employs about 110 hands and rolls

View of a metallic filament electric lamp works at Eindhoven.



View in a bicycle factory at Groningen.

and refines the rough ingots from Germany and Belgium.

These rolling mills export largely and do business with the Netherlands Indies, Belgium, Great Britain, British India, France, Australia, Africa, China, &c. Delft has a factory, employing about 200 hands, which turns out ornaments not only of zinc, but also of iron.

Our manufacturers of chocolate, cheese and other commodities need not go abroad for their *tin foil* (stanniol), important manufactories of this packing material existing at Bois-le-Duc and Vaassen, a village near Apeldoorn.

To complete this general survey, we must also mention a branch of industry, or rather of industrial art, which uses various metals, but especially iron. The Netherlands art ironwork to which we refer, is nowadays and with reason in great request even abroad. It is made principally at Amsterdam, Delft, Rotterdam and Schiedam, where we find large workshops turning out monumental railings and other articles of ornamental wrought iron. Several towns in the south, such as Breda, Roermond and Tilburg, also possess works of this class. As stated, their wares are sold not only in The Netherlands and their Colonies, but to foreign countries as well, particularly to Belgium, Germany, France, Norway, South Africa and China.

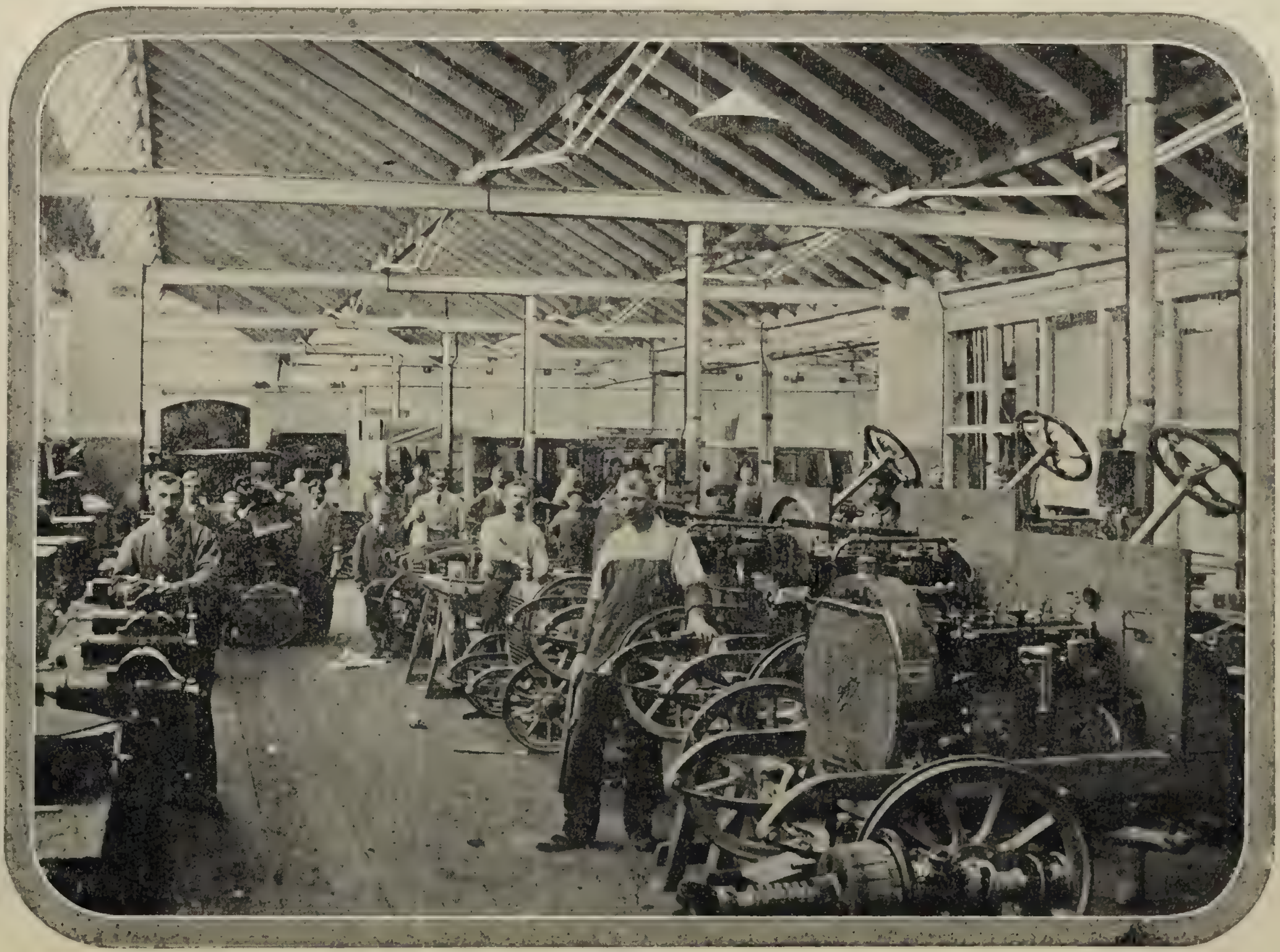
After this general survey, we will now turn our attention to a few separate industries deserving special mention.

BICYCLES AND MOTOR CARS.

Since the appearance of the bicycle, factories of this article have been started in The Netherlands and have gradually developed into very important establishments. Some of them manufacture also separate parts, tubes and accessories.

The principal factories are at Amsterdam (about 500 workmen), Amersfoort, Deventer, Dieren, The Hague, Groningen and Winschoten. Besides these establishments there are of course a number of repairing works of greater or lesser importance.

This trade disposes of its goods, both complete bicycles



Part of the mounting-room in a motor-car factory at Amsterdam.

and frames, in The Netherlands and English Colonies and in several European countries, without counting The Netherlands themselves, where the use of bicycles is steadily on the increase (the number of taxed bicycles has risen from 94,370 in 1899 to 707,595 in 1913).

The motor-car industry has already attained a certain importance in The Netherlands. It boasts 4 factories: two at Amsterdam, one of which also makes bicycles; one at Amersfoort, already mentioned among the bicycle works; and one at Scheveningen. The largest of these works is that at Amsterdam, which devotes itself entirely to the manufacture of motor-cars and motor engines. It employs about 325 hands.

View of a bicycle factory at Groningen.

The output of this trade is sold, in the first place, in this country itself, where the use of motors for the conveyance of persons as well as goods is steadily increasing, and, next, in the Netherlands and English Colonies, Great Britain and South America. Motor-cycles are made at both the cycle and motor works.

CAPSULES.

There are important capsule factories at Amsterdam, Bois-le-Duc, Deventer, Loenen, Loosdrecht, Ouden-Ryn, Tilburg, Schiedam and Loosduinen. They employ about 700 workmen altogether and are equipped with the latest machinery for casting lead and tin, which they obtain direct from the mines, and making this into capsules, both white and coloured. Their output is constantly increasing; and, in spite of the sometimes very heavy import duty, the article finds a market in nearly every country, more especially in Germany, Belgium, Great Britain, the United States of America, Portugal, Australia, the Argentine and British India, not to mention the sale in The Netherlands and her colonies. One of these factories also makes tubes for painters' colours and pharmaceutical preparations.

CLOCK-MAKING.

The clock-making trade in The Netherlands is confined to the production of church clocks, railway station clocks, factory clocks and electric street clocks. Hardly any watches or ordinary clocks are made in this country. The manufactories of church clocks are generally equipped for the making of chimes, a branch of metal-work for which The Netherlands have a long-standing reputation. The Netherlands herself is the largest purchaser of these goods, but orders are also received at times from abroad, as, for instance, from South Africa. The principal clock factories are at Aarle-Rixtel, Amsterdam, Arnhem, Asten, Gilze Ryen, The Hague, Heiligerlee, Hengelo, Midwolda, Nunen and Rotterdam. Electric clocks are also manufactured in some of the instrument-making works at Utrecht.

ENAMEL WORK.

The enamel factories form an industry that works considerably for export. We find factories of household enamelled articles at Gendringen, The Hague, Hattem, Kampen and Wisch. All these works enamel articles made of wrought iron. The Kampen factory produces only wrought iron goods; the others also cast iron ware. At Bergen-op-Zoom and Prinsenhage, stoves, kitcheners, gas kitcheners, etc., are made, all in enamel ware, while at Bussum, Nieuwer

Amstel and Leyden there are factories which produce enamelled sign-boards, street-plates and similar articles.

Enamelled goods and especially household articles are sold partly in this country and partly in the Netherlands and British Colonies, Great Britain, China, Germany, Spain, Sweden, South America, Turkey and the Levant.

FIRE ENGINES AND EXTINGUISHERS.

Fire engines are made in The Netherlands at several engineering works and metal foundries, as, for instance, Amsterdam, Asten, Grouw, Heiligerlee, Hoogezand, Midwolda, Overschie, Rotterdam, Schiedam, Utrecht and Zeist.

The Rotterdam factory is a special one and produces on a large scale steam and motor fire engines, which are sold both at home and abroad, and other fire extinguishing utensils.

One Utrecht factory makes portable fire-extinguishers and chemical extinguishers on wheels.

FIRE PLACES AND STOVES.

In the manufacture of stoves and fire places, the factories have gradually superseded the hand labour of the blacksmith.

The establishments which manufacture wholesale different kinds of fire-places and stoves, such as gas stoves, gas kitcheners and gas furnaces, &c., are mostly at Alkmaar, Almelo, Amsterdam, Ambt-Doetinchem, Arnhem, Bergen-op-Zoom, Bloemendaal, Breda, Deventer, Dordrecht, Enkhuizen, Franeker, Grouw, The Hague, Heerenveen, Hilversum, Kampen, Leeuwarden, Prinsenhage, Rotterdam, Sneek, Tilburg, Ulft, Utrecht and Zeist. An iron foundry at Ulft makes a speciality of upright stoves and kitcheners. These goods are sold not only in The Netherlands, but also abroad, as for instance in Belgium, Germany, Great Britain, and Norway.

GASOMETERS.

There are important manufactories of gasometers, some of which also make water and electric meters, at Dordrecht, The Hague, Rotterdam, Utrecht and Zwolle. These establishments employ, in all, a total of about 700 hands.

INSTRUMENTS OF PRECISION.

Instrument-making is not a very important branch of industry in The Netherlands. It is confined to the large towns and the university towns. Moreover, the instrument-making works in this country are not important establishments, working on a large scale, with a numerous staff. They are noted rather for the quality of their goods, which compare brilliantly with those made in other countries. For this reason, the large foreign firms often place orders in The Netherlands.

As most of the Netherlands instrument-makers specialize in various lines, they can be divided into optical instrument-makers, surgical instrument-makers, orthopaedic instrument-makers, weight and scale-makers, geodetic instrument-makers and makers of electro-technical apparatus, for both low-tension and high-tension currents.

Electro-technical instruments are sold principally in Germany, Great Britain and the United States of America; precision scales and weights in Belgium, France, Great Britain and the United States; geodetic instruments in Belgium, Germany, England, France, Italy, Russia, Spain, the Netherlands Indies and the United States of America. The principal instrument-makers work at Amsterdam, Arnhem, De Bildt, Delft, Gilze Rijen, Hengelo, Rotterdam and Utrecht. These establishments employ in all about 650 hands.

Lastly, we may mention a special branch of this industry, which makes electrical apparatus for automatic advertisements and which has workshops at Amsterdam and The Hague.

MUSICAL INSTRUMENTS.

The industry dealing with the manufacture of musical instruments is represented in The Netherlands by three different groups: piano-makers, organ-builders and makers of metal and wood wind instruments, string instruments, percussion instruments, harmonicas, musical boxes, automatic musical instruments and other similar articles. The piano works, which supply the foreign as well as the home market, are situated at Breda, The Hague, Middelburg, Roosendaal, Rotterdam, Tilburg and Utrecht. England is the largest buyer.

The organ trade may be divided into two branches: the manufacture of church organs and of harmoniums. The first are built principally at Alkmaar, Dordrecht, Goes, Haren, Leeuwarden (established in 1779), Lochem, Roermond, (2 factories), Steenwyk and Utrecht. The factories of harmoniums, built on the American plan, are at Rotterdam, Roermond, Gennep and Utrecht. Organ pipes are made at Heithuizen.

The best known factory of wind and string instruments (which also makes pianos) is at Tilburg. It works on a large scale and particularly for export to other parts of the world. It employs a regular staff of 125 workmen.

SAFES.

This industry, regarded as a separate trade, dates back, in The Netherlands, to about 1870. Before that time, it formed a branch of the locksmith's trade.

Special works were started in this country when a few manufacturers had realized the fact that they could only combat the growing foreign competition by making safes which satisfied the most exacting requirements and which had been tested for fire and falls.

This was especially the case with the factory for the manufacture of safes, iron doors, locks, etc., started at Dordrecht in 1870. It began with two young workmen and to-day employs 350. It is the largest safe factory in The Netherlands and occupies a prominent place among the European factories of this kind. Dordrecht safes are found not only in all the large cities of Europe, but also in the East and West Indies, China, Japan, Australia, South Africa, Egypt, South America and even Iceland.

View in a safe factory at Dordrecht.

There are also factories producing safes and cash-boxes, together with other articles, such as fireplaces, stoves, &c., at Alkmaar, Amsterdam, Arnhem, Breda, Deventer, Doetinchem, Grouw, Haarlem, The Hague, Hilversum, Maastricht, Rotterdam, Tilburg and Veghel.

Turning-lathe workshop in a safe factory at Dordrecht.

TIN-PLATE PACKING.

The great impetus of the trade in foodstuffs and especially in preserves has, at the same time, given rise to an increase in the manufacture of tin-plate packings for hermetical sealing. There are manufactories of these goods at Krommenie (3, with about 780 hands), Delft, Dordrecht (2, with about 450 hands), Deventer, Ysselmuiden, Gouda, Rotterdam, Utrecht, Haarlem, Amsterdam, Leeuwarden, Opsterland, Sneek and Weesp. These establishments manufacture for the home market and also for foreign countries, especially Belgium, France, Germany, England, Turkey, Egypt, British India, China and Australia. Many of them make a speciality of articles in coloured and printed tin-plate for the packing of fancy goods.

TYPE FOUNDRIES.

The type foundries, of which there are not many in The Netherlands, also come under the heading of the metal industry.

There are only two establishments of this class, one at Amsterdam and the other at Haarlem. The latter is conducted by a large and old-established firm of printers. Both have an extensive market for their wares in The Netherlands themselves, in the Colonies and in foreign countries.

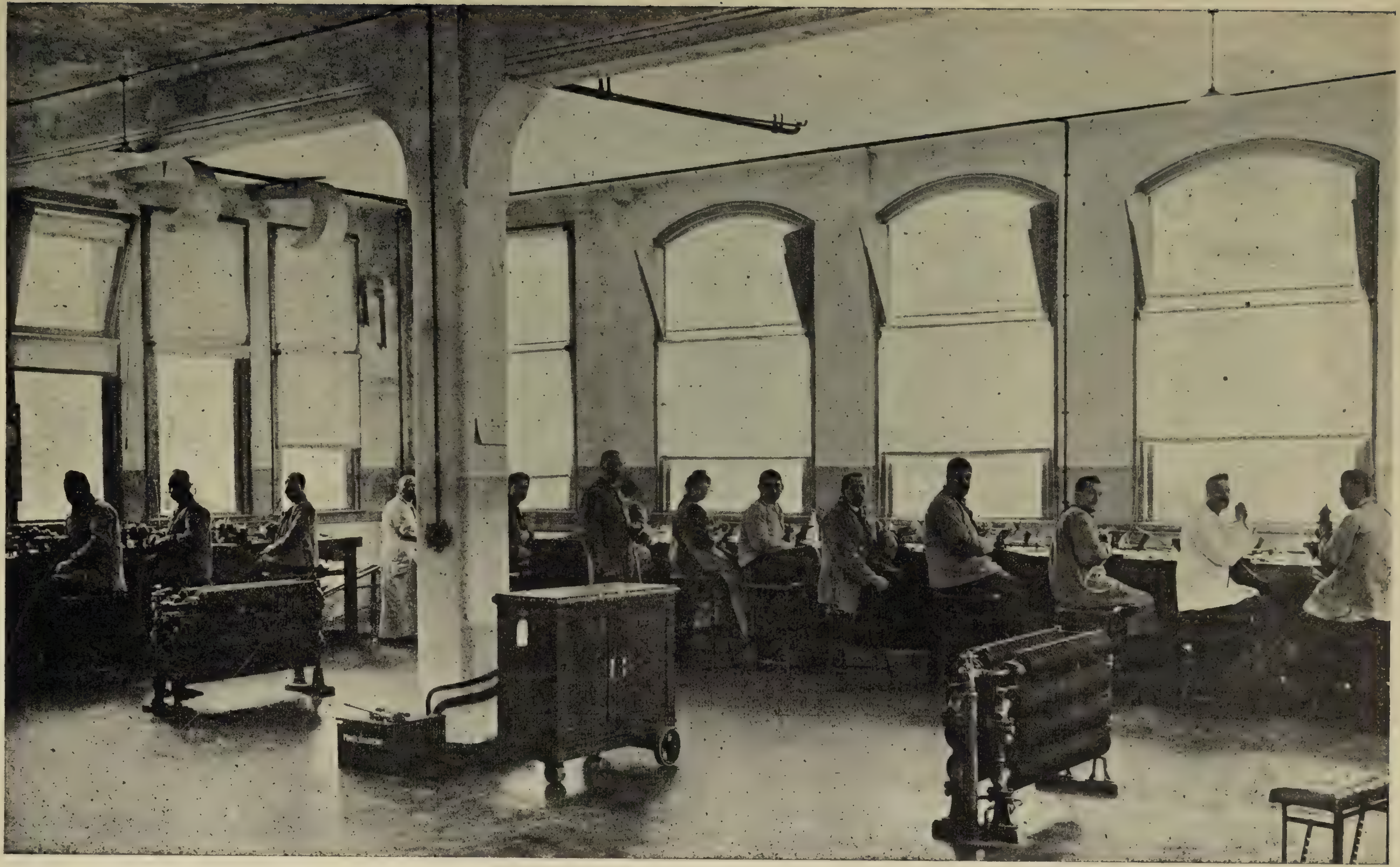
Some factories of minor importance, supplying copper lines, vignettes, tail-pieces and other printing accessories and also casting *à blanc* are scattered about the country. There is one, in particular, at The Hague.

VIII. THE DIAMOND TRADE.

The diamond trade is one of the most important Netherlands industries. It is confined almost exclusively to Amsterdam.

At the commencement of the seventeenth century, Amsterdam was already an important centre for the jewelry trade; the big firms there found buyers in most other European countries. The discovery of diamonds in Brazil, in 1727, and the working of the mines of Minas Geraes further stimulated the diamond industry and encouraged the trade in precious stones at Amsterdam.

The growing luxury of the period increased the demand; and the annual total of the business soon began to run into millions. At the same time, the Portuguese, Polish and



View of a workshop in a diamond-cutting establishment at Amsterdam (with men and women rough polishers at the wheels).

German Jews established in Amsterdam devoted their attention more and more to the diamond industry and trade.

In 1820, when the first factory was founded in which the driving-power for the wheels, formerly worked by hand, was supplied by horses, the domestic industry became transformed into a factory trade. Nevertheless, certain special work is still performed by individuals working at home. Soon, three more diamond-cutting establishments were opened at Amsterdam, and, in 1840, the first diamond-cutting factory was started.

View in a diamond workshop at Amsterdam

To day, there are in Amsterdam about 200 diamond-cutting establishments (that is to say, works where the diamond is not only hewn, but sawn, cloven, cut, etc.).

The number of workers employed in the various branches is estimated as follows:

Sawers	146
Cleavers	325
Rough-polishers (men and women)	1,827
Cutters and bezellers	7,000
Total	9,298

The motive power is supplied by about 100 steam-engines, about 5 electric motors and about 10 gas and petrol-motors, amounting altogether to about 3,000 horse power.

Including the home workers, about 10,000 persons are employed at Amsterdam in diamond work.

The remarkable thing about this industry is that, with a few rare exceptions, the proprietors of diamond-cutting works are not lapidaries.

The diamond trade is remarkable for the solidarity existing not only in the ranks of the employers, but likewise among the employees, who belong to the most intelligent class in the labour world.

Diamond-cutting factory at Amsterdam.

Outside Amsterdam, the diamond industry is pursued, for account of certain lapidaries of that town, at Bussum, Haarlem and Hilversum, all in the neighbourhood of Amsterdam.

The South African rough stones are mostly brought to London, where the Amsterdam merchants buy them either direct or through brokers who carry them to the Continent. The rough diamonds from Brazil are brought to Paris.

The Netherlands trade transforms the rough diamonds into brilliants of all shapes, rose-diamonds, "non-recuts" and "eighteights." The sale of cut diamonds in The Netherlands is of no great importance. Much larger quantities are sold in other European countries; but by far the greater part go to the United States. American statistics give the following figures:

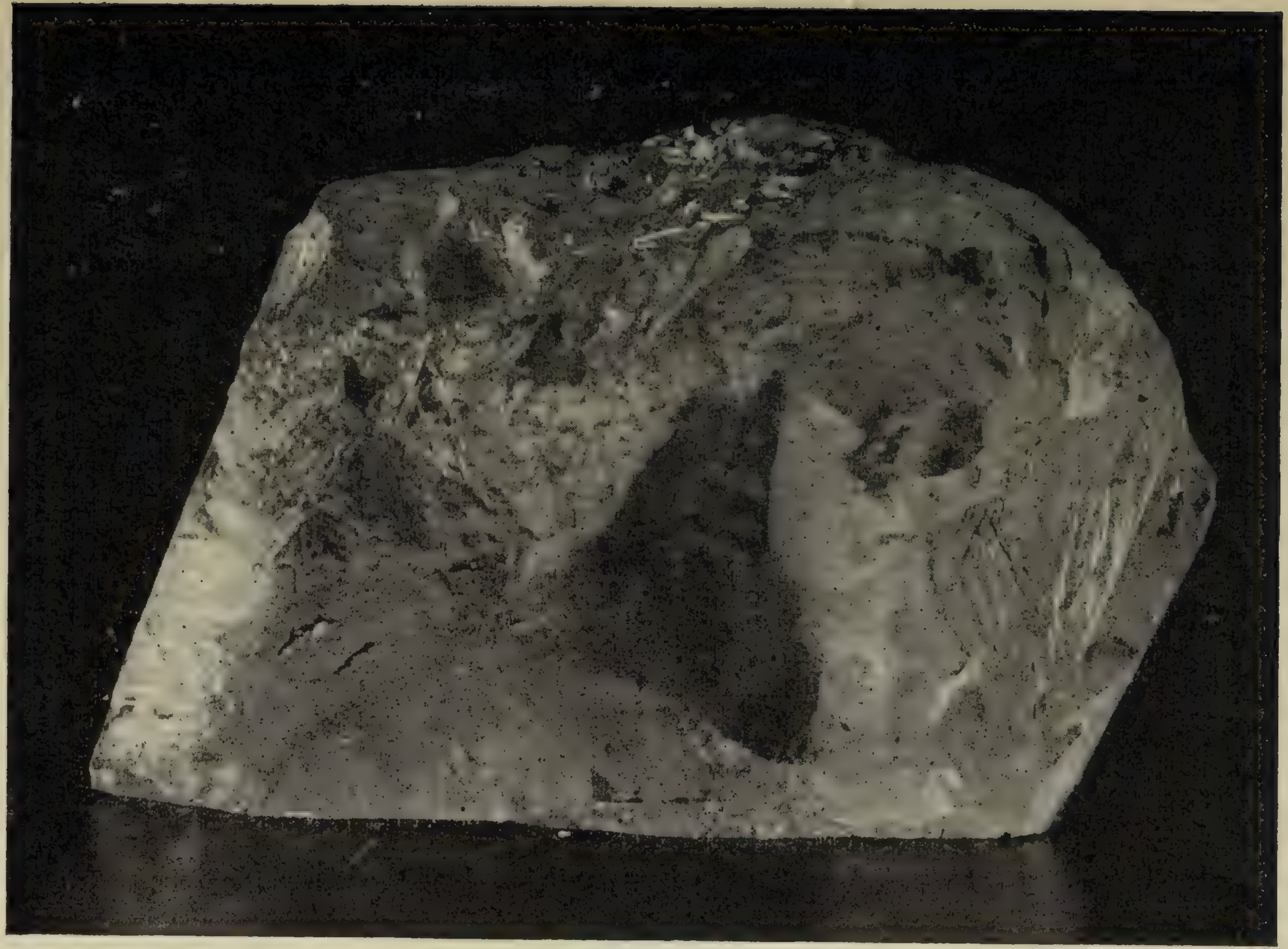
IMPORTS OF CUT DIAMONDS IN THE UNITED STATES.

(In Dollars).

Year.	Country of Origin.			
	Netherlands.	Belgium.	France.	United Kingdom.
1906	10,192,821	4,578,361	5,007,792	4,307,811
1907	11,458,654	5,201,211	3,390,995	3,752,871
1908	3,688,050	2,718,703	1,086,809	1,691,720
1909	8,792,737	7,776,268	2,388,872	836,786
1910	11,492,754	11,253,536	4,238,421	2,346,794
1911	9,330,157	10,440,556	2.913,594	1,591,019
1912	9,601,027	9,225,468	3,903,002	1,692,495
1913	10,852,525	11,997,091	2,483,290	1,583,241

The cut diamonds imported from the United Kingdom no doubt included a portion that had been cut in The Netherlands.

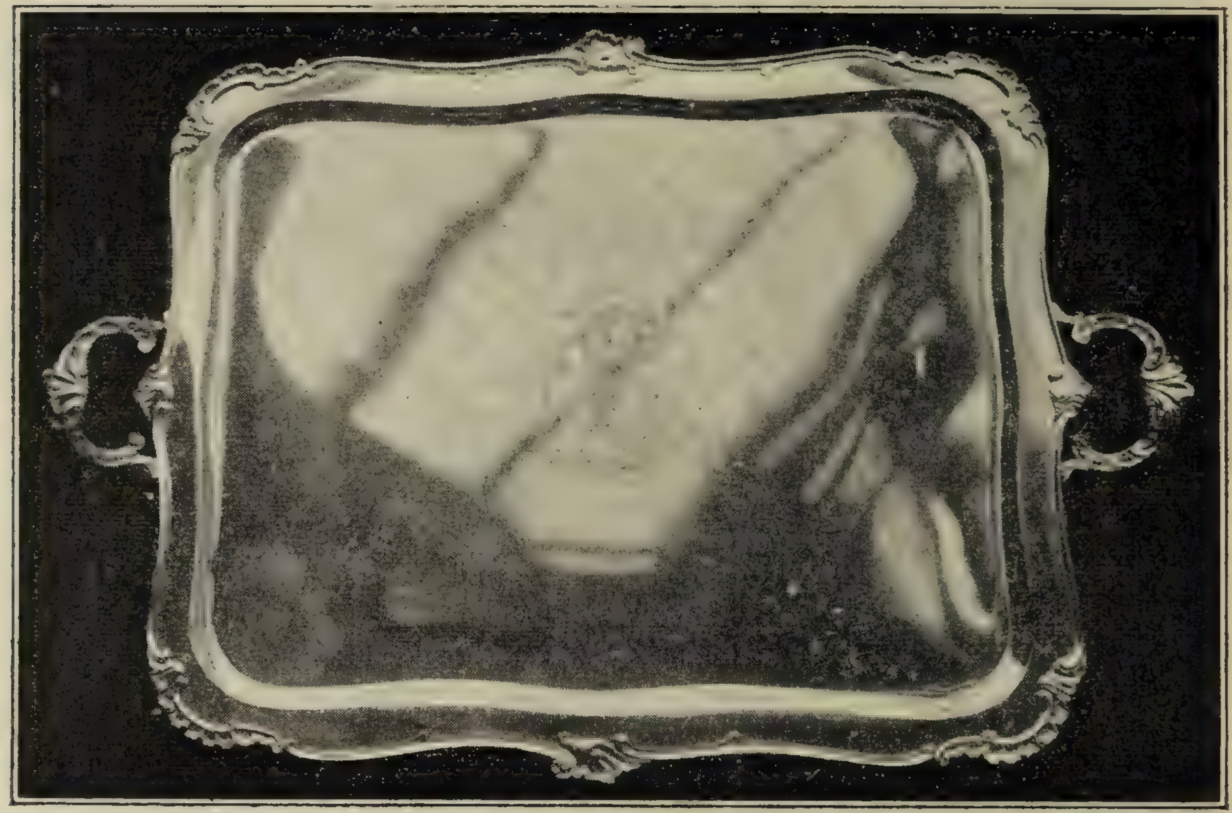
Lastly, we must remember that most of the famous diamonds, such as the *Victoria*, the *President Reitz*, the *Excelsior* and the magnificent *Cullinan*, were cut at Amsterdam and that the famous *Koh-i-Noor*, the historic stone presented to H. M. QUEEN VICTORIA, in 1850, was cut in the shape of a round brilliant in London, in 1852, by a diamond-cutter from Amsterdam. These are eloquent proofs of the high position occupied by the Amsterdam diamond industry.



The Cullinan diamond, the largest diamond discovered up to the present date.
(From the Premier Mine in South Africa. The stone weighed in its rough state 302$^{3}/_{4}$ Carats).

IX THE GOLDSMITH'S TRADE.

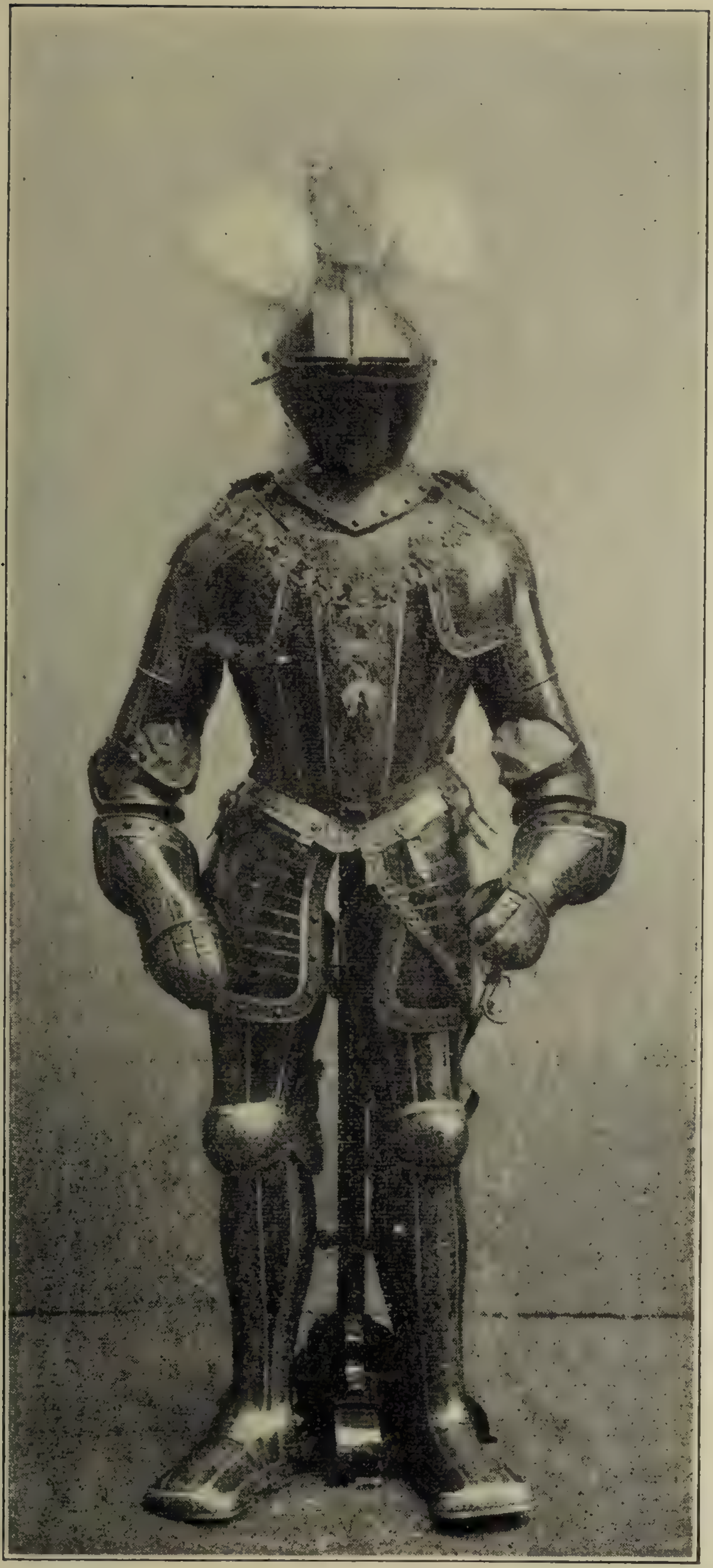
In The Netherlands, the gold and silversmith's art existed as long ago as the Middle Ages. At the commencement of the sixteenth century, this trade had developed so largely that, in 1502, Philip the Handsome enacted a law for Holland, Zeeland and West Friesland for the stamping of gold and silver ware.



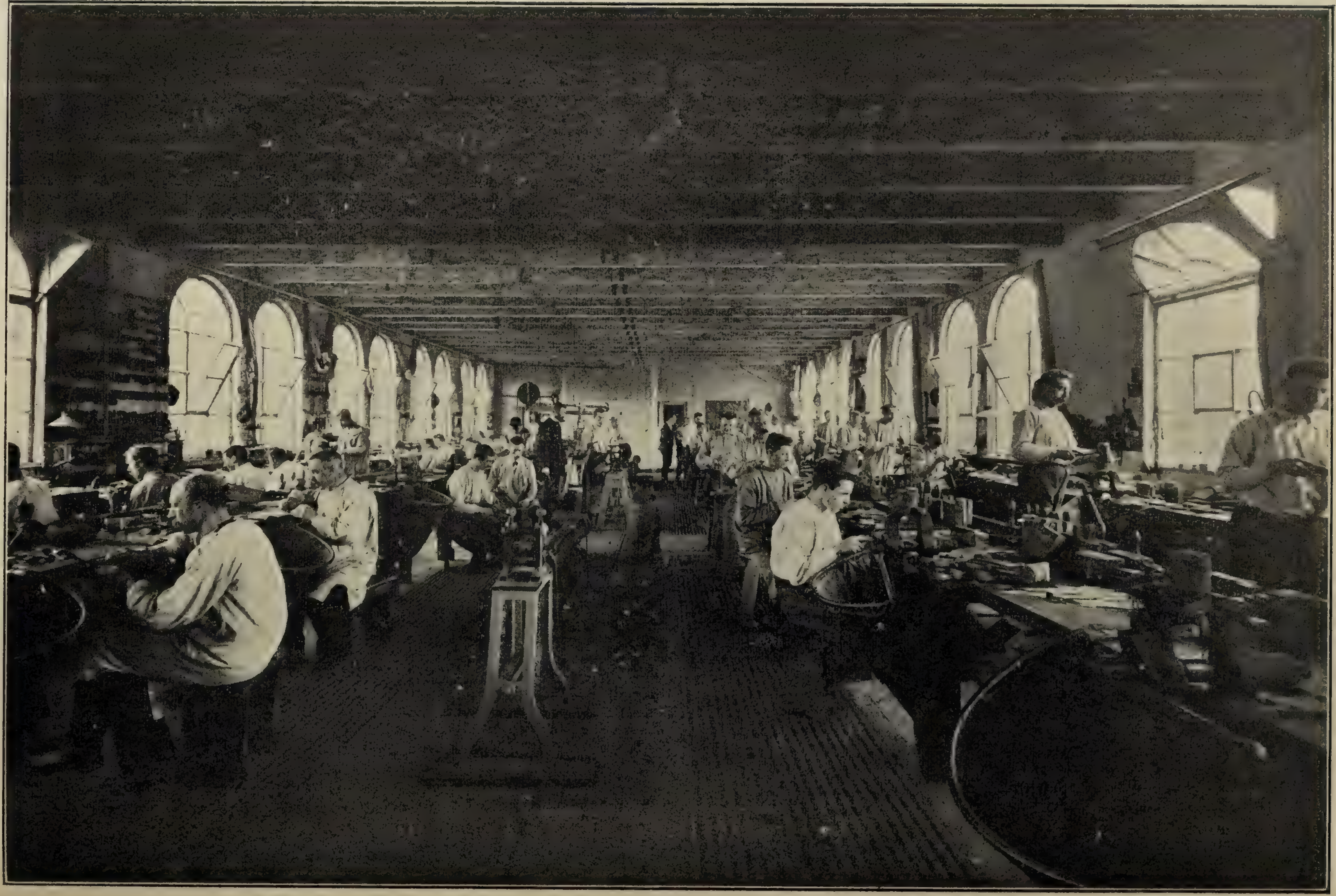
Set in the style of the middle of the 18th century.

In the seventeenth century there existed an important trade of this kind at Amsterdam; and Schoonhoven, a small town in South Holland, and especially Friesland, were also noted for their flourishing gold and silversmiths' industry, which employed a great part of the inhabitants. Many gold and silversmiths of that time were real artists.

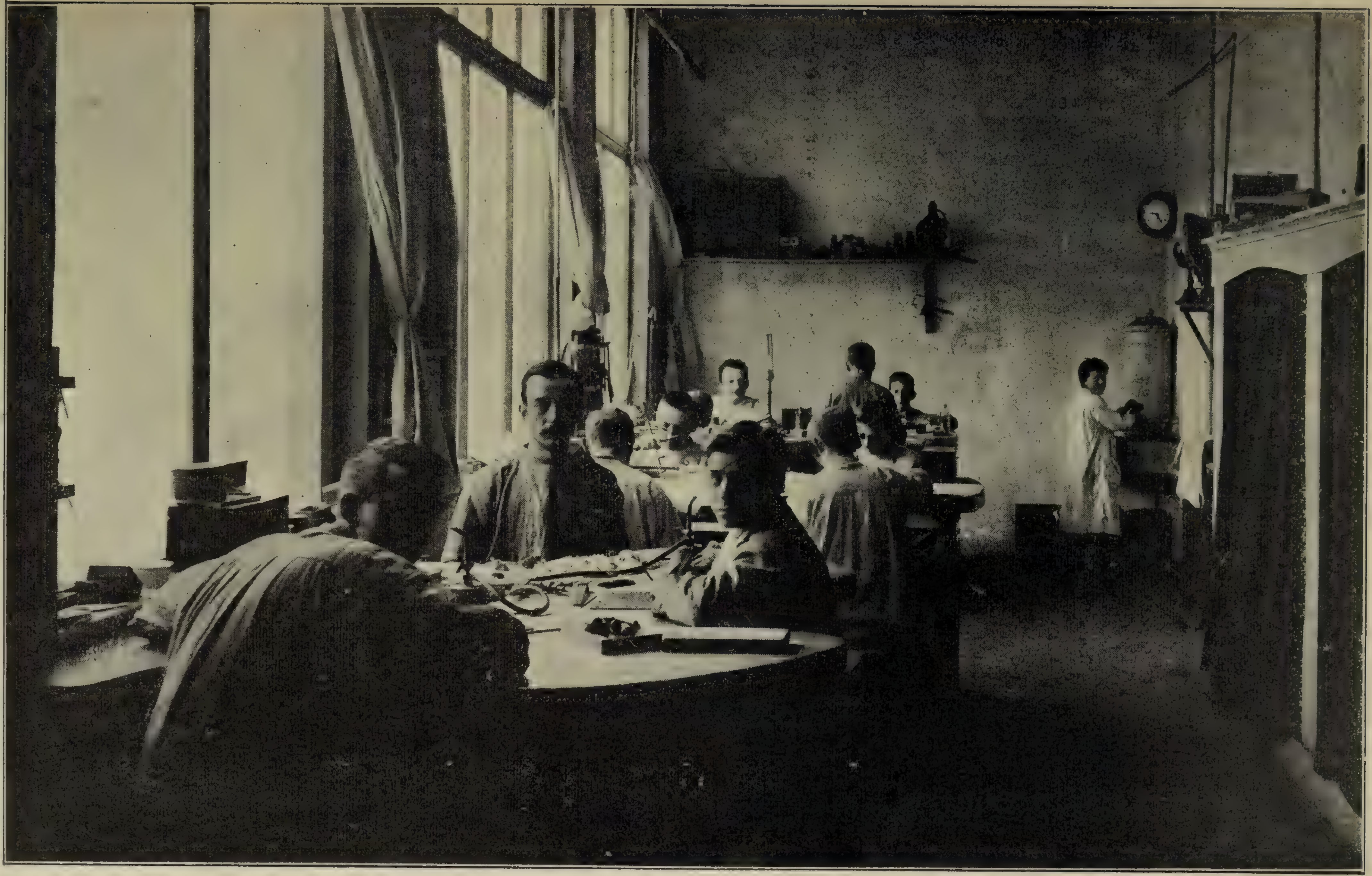
It is true that the plate was always superior in solidity to that made in foreign countries, which exported principally rolled gold and silver articles covered with a layer of precious metal so thin that, to use them, it became necessary to



Harness of steel incrustated with gold, made in a silver factory at Utrecht



One of the silver-mounting departments in a gold and silver factory at Voorsch



Diamond-mounting department in a gold and silver factory at Voorschoten.

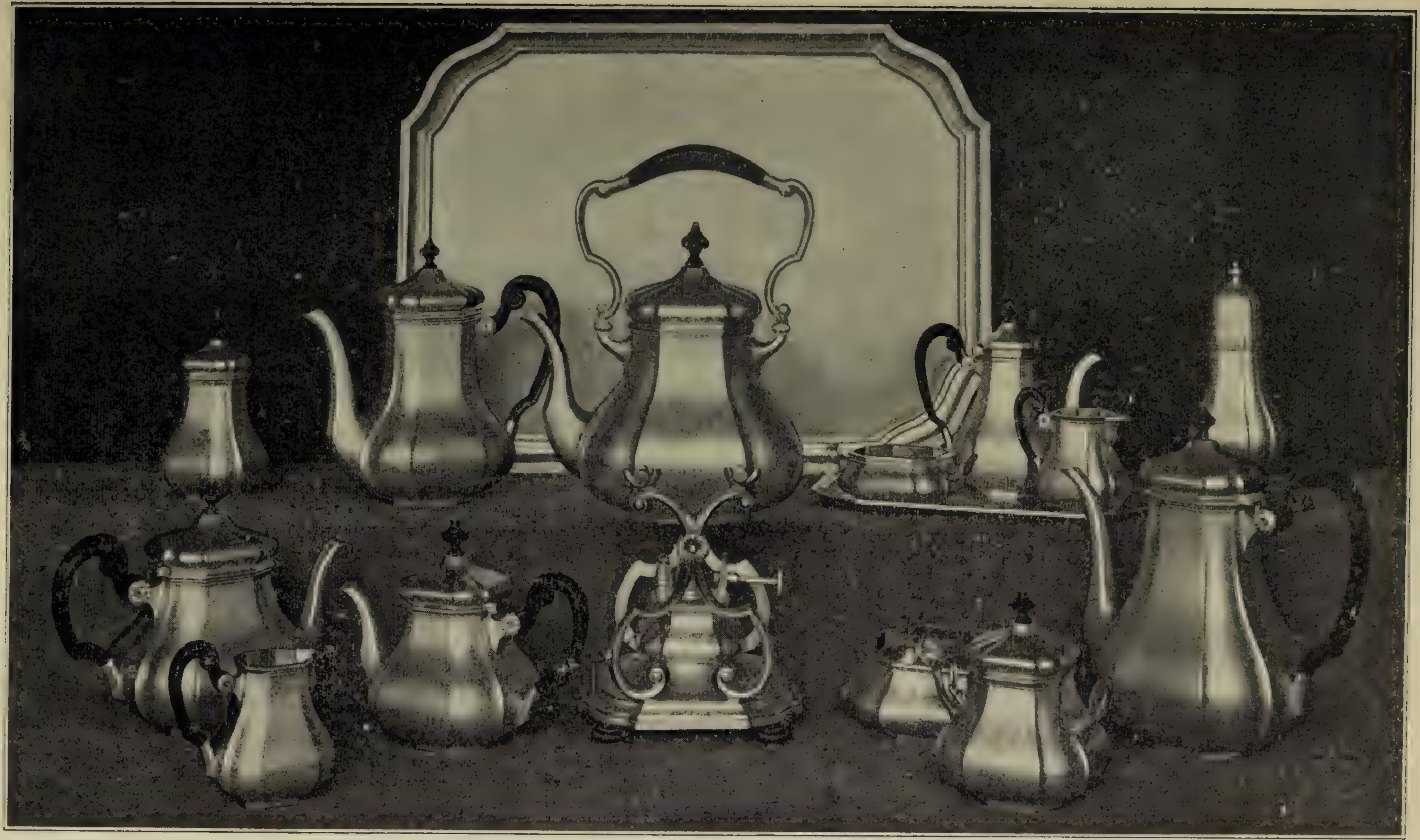
fill them up with other substances. Amsterdam continued to make solid plate in massive silver renowned for its technical finish. Nevertheless, a lack of taste was shown in the matter of ornamentation The shapes betrayed a mixture of styles; and the historical sense was altogether absent.

Some people, however, worked strenuously to raise the goldsmith's trade in The Netherlands from the mere handicraft that it was to the rank of a great industry. Thus in 1858 a small factory then existing at Utrecht was transferred to Voorschoten, where it developed largely. To-day it employs 270 workers. Factories were also established in other places. This was the case not only at Amsterdam, where, formerly, mainly plain pieces, with a bead border and openwork ornaments, were manufactured with the greatest care, and at Rotterdam, but also in Friesland, where, in the days of returning prosperity, they took to copying antique models.

In addition to Voorschoten, there are now in The Netherlands several manufactories of gold and silver articles working on a large scale. These firms are established, for the most part, at Amsterdam, Bois-le-Duc, Groningen, Haarlem, The Hague, Hoorn, Leeuwarden, Nymwegen, Rotterdam, Schoonhoven, Sneek, Utrecht and Zeist.

The majority of these manufactories have their special lines. Thus, at Amsterdam, they devote themselves particularly to chasing, to the mounting and setting of precious stones in rings, bracelets, ornaments, etc., to the engraving of coats-of-arms, monograms, etc., and to the execution of other work of this sort. There are, besides, two special manufactories of gold chains for the wholesale trade.

At Utrecht, as well as at Voorschoten, they manufacture a great variety of silver articles, in the form of both large pieces of plate and valuable articles of jewellery. The Utrecht factory, however, devotes itself more particularly to the manufacture of presentation cups and commemorative medals. The Utrecht factory was founded in 1857. Its owner has striven, in particular, to place the art of the medallist on a very high pinnacle; and he has succeeded to such good purpose that not only can that art now vie with the foreign



Complete silver tea-set, made in a gold and silver factory at Voorschoten.

production, but the Netherlands work has a peculiar artistic charm of its own, which often causes it to be preferred in other countries.

Another factory at Utrecht makes a speciality of jewellery and has succeeded in creating a world-market for its wares. It produces gold jewellery, ornamented with precious stones, of every description, but more particularly studs and rings. An establishment at Haarlem devotes itself to the manufacture of another description of ornaments. It sprang from a quite small silversmith's factory at Zaandyk and now enjoys a great reputation, even in the most remote countries, for its silver plate made after antique models. In two Amsterdam workshops, gold and silver chains are made on a large scale.

In addition to these large establishments, there are several small ones, with shops attached to them, which are mainly engaged in repairs and alterations. In the large towns, nearly all the goldsmiths are also jewellers and dealers in precious stones (diamonds, pearls, &c.).

A goodly number of small gold and silversmiths are established at Schoonhoven, in Friesland (especially at Leeuwarden and Sneek) and in Brabant (especially at Bois-le-Duc). Including the larger establishments, about 470 workers are employed in this industry at Schoonhoven. At Bois-le-Duc there are about 170 workmen employed.

This industry finds a good market in the country itself, in the Netherlands Colonies and in other countries, such as Belgium, France, Germany, Switzerland, Italy, Denmark, Great Britain and the United States.

The Netherlands gold and silversmiths buy their raw materials from either Netherlands or foreign gold and silver merchants, while for gold articles they to a large extent use the gold coinage of the country.

We must also mention the workshops occupied more particularly with works of religious art, which does not by any means exclude the execution of works of secular art. The most important of these workshops is at Utrecht and produces articles for divine worship, church ornaments and other works of art in gold and silver of great value and of a workmanship well worthy of the admiration which it excites both at home and abroad.

The other ecclesiastical art works are at Bois-le-Duc, Eindhoven, Haarlem, Nymwegen, Tilburg and Weert.

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A GENERAL VIEW OF THE NETHERLANDS

NUMBER VII.

INDUSTRIES BY P. DOYER

MECHANICAL ENGINEER

PART. V

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